CHIROPRACTIC HYGIENE
AND
PEDIATRICS

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A TEXT-BOOK

ON

HYGIENE AND PEDIATRICS

From a Chiropractic Standpoint

BY

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DEDICATION

In grateful recognition of his wise counsel and valuable aid in the production of this work, in sincere appreciation of the firm principle for which he has ever stood even in the face of almost overwhelming opposition and many times alone save for the few who understood him, and because of the love I bear him for having saved the life of my son, I count it a privilege as well as a very great pleasure to dedicate this book to B. J. Palmer, D.C., Ph. C., scientist, philosopher, author, but best of all just my plain, frank, candid friend, B. J. of Davenport.

John H. Craven

PREFACE

More than ten years ago when I began teaching hygiene in the Palmer School of Chiropractic, I realized the need of a text-book that would deal with this subject from a chiropractic standpoint.

Many points maintained by hygienists are not in accord with the teaching of Chiropractic, since they are proven untrue by our philosophy. For this reason much subject matter in such text-books was of no value to our students; hence the necessity for a chiropractic hygiene text.

It has been no easy task to prepare this subject matter in view of the conflicting teachings and ideas pertaining to the various phases of hygiene, but the principles of Chiropractic are in no way compromised and the student, from a casual perusal of any one particular phase of the subject, should not draw conclusions that any medical theories of dis-ease are being tolerated.

An effort has been made to include only that part of hygiene pertaining to our science. Since sanitation pertains especially to the environment, the approach to its study is the same regardless of the viewpoint from which it is considered.

Section II, dealing with the care of the infant and the adjusting of children, has been written in response to the hundreds of inquiries which have come in from the practicing chiropractors in the field requesting such a work. This is not intended as an exhaustive study in the care of the infant; its purpose is merely to give a general understanding to those who are interested in adjusting babies.

The technic used in adjusting children is of great importance and is so considered.

It is sincerely hoped that this hygiene will fill the long-felt need on the part of our Faculty for such a text, and that pediatrics considered chiropractically will be of assistance to those in the field who have requested a work on this subject.

February, 1924. JOHN H. CRAVEN

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SECTION I

CHIROPRACTIC HYGIENE

CHAPTER I

INTRODUCTION

Origin of the Word Hygiene

Hygeia was the name given the Greek goddess of health. In her statues she was always represented as a woman of perfect health and beauty, and was worshipped as the goddess of health. She was supposed to be the daughter of Esculapius, the god of medicine. In Greek mythology Esculapius attained great fame as a physician, having power not only to prevent dis-ease, but also to raise the dead. A temple was erected to Hygeia near that of her father. Here the people came to worship. There was even a statue of Hygeia in the temple of her father. Thus we see, from time immemorial, health and medicine have been associated.

Hygiene Defined

From the word Hygeia we get the word hygiene, which means health. Hygiene is defined as the science and the art of promoting health; the science of the preservation of human health by the removal of the cause of dis-ease. It is sometimes defined as the science of health. Hygiene is divided into two classes, personal and public.

Personal Hygiene is the science of the promotion of the individual's health and deals with personal habits, such as eating and drinking; personal cleanliness; personal activities such as work, recreation, self-restraint. The handling of children comes under this branch of hygiene. The human

machine is limited by the limitations of the physical, which necessitates the observance of these laws governing the expression of life.

Public Hygiene deals with the methods and processes necessary to preserve and promote the health interests of the public. It deals with man collectively rather than individually. This includes consideration of the environment, such as cleaning of streets, disposal of the dead, and proper hygienic methods in buildings and in public places.

Sanitary Science

Sanitary science includes the sum total of the knowledge of those principles and processes necessary to maintain personal and public health. It is an inductive science and therefore depends upon observation and verification in determining the general laws and truths of health and the relation between cause and effect in public and personal health.

Sanitary Art

Sanitary art is the practical application of those principles which are necessary to create a proper environment for man in his present artificial state of living, not only for the individual, but for the public as well.

Distinction between Sanitation and Hygiene

The term sanitation or sanitary science is often used synonymous with the term hygiene although there is a difference in their meaning and usage. The term sanitation or sanitary science has been used largely in Great Britain and in this country, although both terms are used in America but with somewhat different meanings.

In reality there is a very important distinction between the two terms hygiene and sanitation. Hygiene may be considered the broader term which may be made to include everything relating to health, but more particularly those things which relate to the person. Sanitation or sanitary

science relates more to the environmental conditions and their relation to the health of the individual or the community.

This distinction is drawn more sharply by reason of the developments along the line of sanitary engineering on the one hand and the biological and physiological developments on the other.

Sanitary science has been largely under the supervision and in the hands of sanitary engineers, while hygiene has been almost entirely in the hands of the medical profession.

Aim and Function of Hygiene and Sanitation

Medically the aim and function of hygiene is to increase the internal resistance of the individual and thus prevent dis-ease and prolong life. The aim and function of sanitation or sanitary science is to improve the environmental conditions and thus prevent dis-ease and prolong life of the individual.

Doctor Price gives the aim and function of hygiene as: "The prevention of disease, the prevention of premature death, and the promotion of normal health of individuals and the community by the removal of the causes of disease, destruction of the causes, improvement of the environmental conditions, and by the increase of the vital resistance of the individual and members of communities." The premise here is correct, but the conclusions as to the methods which are to be used in accomplishing the desired end are erroneous.

Internal and External Cleanliness

There is a distinction between internal cleanliness and external cleanliness. It is a mistaken idea that because the external is clean, the internal will be correspondingly clean. Cleanliness is absolutely essential to health, but by this we mean internal cleanliness. There must be external cleanliness also, but perfect external cleanliness will not necessarily result in perfect health.

Vital resistance of the body is not determined by the degree of external cleanliness nor by the perfect sanitary condition of the environment. However, it can never be said that Chiropractic does not believe in cleanliness. Chiropractic, of all the sciences, lays great stress on hygiene and sanitation. Our greatest teacher in all things is Nature and if there is any one thing that Chiropractic insists upon more than any other, it is that we live according to the laws of Nature and the closer we live to Nature, the more normal will be our functions. When we study the laws of Nature, we find the secret of sanitation. Everywhere in Nature we find laws in operation which result in the destruction of waste material and in the purification of the environment.

From the standpoint of common decency we are interested in sanitation or cleanliness, yet an immaculately clean environment will not result in perfect health or in the cure of disease. The streets and alleys of the city may be kept clean and in a sanitary condition, yet the inside of the homes may be filled with filth. So the environment of man may be in a perfect condition so far as sanitation is concerned, yet the body may be filled with all kinds of poison and refuse.

Sewerage System of the Body

The human body is a machine which performs certain functions and in order that these functions be performed there is a constant process of activity; this means that the tissues which make up the body are being constantly worn out the same as the part of any other machine. This necessitates a constant process of repair.

In order that this process of reparation be carried on, new material must be added to the machine; this is done by means of food. The food is taken into the mouth and properly masticated and mixed with the secretions of the glands of the mouth; it is then carried through the esophagus into the stomach. Here other digestive juices are added to it and

thoroughly mixed by the vermicular motion of the stomach until the process of gastric digestion is completed; then this chyme, as it is now called, passes into the small intestines, where other secretions are added and chemical changes are brought about until this process of intestinal digestion is completed. This product is given the name of chyle.

During the time these processes have been going on, the process of absorption has been taking place whereby this digested food has been utilized in building up the tissue cells that are being constantly worn out by the activities of the body. The digested products are being taken up by the serous circulation and carried to every cell in the body. That which one cell gives off as an elimination, another may take up as food, finding just the chemical composition necessary to its life and development. Finally all of the waste material is collected and eliminated from the body through the organs of elimination. Innate Intelligence has provided a wonderful sewerage system for the purpose of taking care of the sewage of the body. This system is much more perfect than any system ever invented by man, but it is possible for it to get out of order. The remarkable thing about it is that the Intelligence within the body is capable of correcting the disorders if the interference with transmission to the affected parts is removed. All that is necessary from the outside is to remove that which is interfering with the transmission of the mental impulses.

As long as there is interference with the transmission of mental impulses we may apply all the laws and principles of hygiene and sanitation, yet the internal condition will not be hygienic or sanitary. We may, by an artificial means, remove the waste material that has accumulated, but this will not stop the process of accumulation.

In view of the fact that the above mentioned processes of absorption and elimination are taking place, let us assume that there is a subluxation at the kidney place (K.P.) imping-

ing the nerves and interfering with the transmission of mental impulses to the kidneys. With decreased current the kidneys are unable to perform their normal amount of function and as a result the waste material, poisons, or in other words the sewage that is supposed to pass out through this channel of excretion, are retained in the body. The poison thus retained is spread over the entire body and there is likely to be excessive perspiration which will have a strong odor of urine. This is because the skin, in its excretory function, is called upon to throw off the waste material which normally should be excreted by the kidneys. Although there is no perspiration there will still be a very offensive and objectionable urinary odor from the patient's body. From a hygienic standpoint it is necessary for that patient to bathe very often, but no matter how often he bathes, there is still that odor of urine and it is impossible for him to get rid of it. One may thoroughly and frequently cleanse that patient externally, but there will remain that unsanitary internal condition.

Trying to get rid of the odor of urine and to create a sanitary internal condition in a case of this kind by external bathing and by the observance of sanitary laws would be like trying to keep a boat from sinking by dipping the water out when it was running in twice as fast as one could dip it out. It would be better to stop the leak. If the roof of one's house leaks he does not try to keep the house dry by mopping up the water and putting chlorid of lime about the rooms to absorb the moisture. This may be done as an adaptative measure to the condition that exists because of the defect in the roof, but to correct the condition one must go directly to the roof and repair it so that no more damage may be done the interior of the house.

So in the case of the K.P. subluxation and the unsanitary condition resulting from the accumulation of waste material in the body, it is folly to try to correct the condition by any other method than by removing the cause. The sewage must

be carried out through the natural channels and any attempt to dispose of it by any other or artificial means will meet with absolute failure.

Three Viewpoints on Hygiene

According to Dr. B. J. Palmer there are three viewpoints of hygiene; that is to say, there are three aspects from which the subject of cleanliness may be considered: namely, the medical, layman's and chiropractic hygiene. The chief differences are: the medical hygiene tries to make the internal condition sanitary by the application of external means; the layman's hygiene makes the external condition sanitary by the application of external means; the chiropractic hygiene makes the internal condition sanitary by permitting the internal forces to operate unhindered in the body.

We see that from every viewpoint, hygiene means cleanliness. The only real difference in these viewpoints consists in the methods used to obtain this desired end. The layman maintains a sanitary external condition by observing the laws of Nature. When dirt accumulates on the outside which creates an unhygienic and objectionable condition, he uses soap and water to cleanse the outside. His unhygienic condition is outside of the body and he uses outside means to rid himself of that condition. It is very obvious that this is a perfectly proper procedure and if correctly and systematically applied it will produce a hygienic external in so far as that condition is influenced by external environment.

The most baffling unsanitary and unhygienic conditions are the internal, and yet if these conditions are considered in the light of the same common sense as is applied to the external conditions, no great amount of difficulty will be experienced in coping with them. However, great difficulties will be experienced if an effort is made to keep the internal in a proper sanitary condition by the application of external means. This has been well demonstrated in the application of medical

hygiene. However, the author does not want to be understood as implying that a great deal of good has not been accomplished in the investigations that have been made along the line of hygiene and more especially in sanitary science. But when chiropractic philosophy is properly understood, it will be readily seen that it is far better to clean the inside from the inside than to attempt cleaning the inside from the outside. With all due regard it must be said that up to the time of the introduction of chiropractic hygiene all the efforts were to clean the inside from the outside, but Chiropractic says the inside must be cleansed from the inside and this contention has been amply proven in the results obtained through chiropractic adjustments.

Advantages of a Proper Sanitary Environment

The body is capable of great possibilities in intellectual adaptation. It is possible for Innate Intelligence to maintain a degree of health in widely different conditions. Even where the environment is extremely adverse and objectionable Innate will adapt herself to the abnormal condition and maintain the normal processes of life in the body. However, it must be remembered that a greater amount of internal force is required to bring about an intellectual adaptation to an adverse environment than to a normal, natural or more perfect environment.

There must be a constant process of adaptation to the environment even though that environment be a most desirable one. All internal processes must of necessity be adaptative to external conditions. Drummond says, "Life is uninterrupted correspondence with proper environment." This is true of the expression of life. If the correspondence with the environment is interfered with there will be a corresponding interference with the expression of the life in the body.

The more adverse the environment the greater the amount of force required to bring about this adaptation. Likewise, the reverse is true—adaptation to a more desirable environ-

ment requires less internal force. We should not compel Innate Intelligence to do things that we could do educationally and save the body that extra amount of internal force. To illustrate, one should not unnecessarily expose his body to the cold and thus force Innate to expend internal energy to adapt the body to that condition. One might better put on proper clothing to protect the body. On the other hand, one should not go to the other extreme and make a hothouse plant of his body.

A proper sanitary environment should at all times be maintained that there may not be an unnecessary drain on the adaptative forces of the body.

Cause of Dis-ease

Chiropractic does not accept the theory that dis-ease is caused by extrinsic conditions. There may be a great variation in the environment and yet Innate Intelligence be able to maintain health. If there is sufficient interference with the transmission of mental impulses through the nerves, there will be dis-ease in the body regardless of the perfect environment that may be artificially produced. If the transmission is normal the individual may take the so-called dis-ease germs into his body and feel no ill effects for they will be excreted as so much waste material which can not be used in the metabolism of the body. But if there are subluxations which interfere with the transmission of mental impulses and reduce the process of excretion the tissues will become abnormal and proper culture media will be formed in which there will be developed the germs which act as scavengers for the purpose of destroying the waste matter which accumulates. The cause of dis-ease is within the body itself. The cause of dis-ease is interference with transmission of mental impulses from the brain to the periphery, thus preventing the organ from performing its full and normal function. This results in a lack of coördinate action between the organs of the body

and interferes with the intellectual adaptation to external conditions.

The question may be raised at this time relative to the effects produced by the introduction of poison into the body and relative to germs being classed as poisons producing certain effects in the body.

We will not endeavor at this time to fully deal with these questions, for in order that the student understand thoroughly the chiropractic idea of these things, it will be necessary to study many points, both in connection with the hygiene and also with the philosophy of Chiropractic.

This point is thoroughly covered in the philosophy under the head of the Poison Cycle. We will simply state briefly here that a poison is anything which can not be used in the metabolism of the body and which, if allowed to remain in the body, will be carried to the tissue cells and do harm. In this event Innate will at once begin a process of elimination. If the channels of excretion are not normal and the organs are unable to do their work properly because of the interference with the transmission of mental impulses, it can readily be seen that the poison will be retained in the body and do harm. The character of the injury will be governed by the character of the poison retained.

Again, it is clearly explained in the philosophy how the introduction of poison into the body may produce subluxations and thus cause an interference with transmission and reduce the adaptative action on the part of Innate to the poison introduced. The student is referred to Volume V, Chiropractic Library, for further explanation on this point.

Sources of Communication

Generally speaking, there are two main sources whereby dis-ease is communicated: (a) man himself; (b) the animals. Almost all of the so-called communicable dis-eases of man are peculiar to man alone and are not found in animals except

as they are communicated to them for experimental purposes. It is interesting to note that the lower animals are much more free from contagious dis-eases than man. As a matter of fact, the lower animals are seldom found to be infected. It is true that the domesticated animal is more susceptible to dis-ease than the wild animal living in the natural state.

Following is a list commonly given as communicable diseases peculiar to man and according to medical theory communicable from man to man. Even among those who accept this theory there is quite a difference of opinion as to the dis-eases that should be included in this list. Smallpox, chicken-pox, cholera, leprosy, dengue, relapsing fever, measles, mumps, scarlet fever, infantile paralysis, typhus fever, yellow fever, malaria, syphilis, tuberculosis and typhoid fever. It is maintained by hygienists that the greatest source of infection is man himself. No longer is it thought that the environment is the main source of infection. It is believed by Rosenau and others that the water, soil, air and food may be the media conveying dis-ease from man to man; these, however, are not now considered as the main source of infection. Rosenau says, "Most of the microörganisms causing the communicable dis-eases of man are frail and soon die in our environment, as in the air, soil or water. Most of them are obligate pathogens and can not, or do not, grow and multiply under the adverse conditions of our environment." And yet these frail little creatures are supposed to cause dis-ease in man. We wish the student to bear this in mind for we will have more to say in this respect later on.

It is sufficient to state here that the above named dis-eases maintained by some to be caused by germs are corrected by chiropractic adjustments. Chiropractic has proven that instead of dis-ease being caused by the germ the germ is produced by the dis-ease.

CHAPTER II
HOUSING HYGIENE

HOUSING HYGIENE

GENERAL CONSIDERATIONS

Site

RELATION TO HEALTH
EFFECT OF DAMP SITE

Aspect

MOST SUITABLE
ARRANGEMENT OF ROOMS
DIRECT RAYS OF THE SUN

Soil

RELATION TO HEALTH
MOST SUITABLE SOIL

Ground Water and Ground Air

FLUCTUATION OF
DISTANCE OF GROUND WATER FROM SURFACE
GROUND AIR FORCED INTO BREATHING ZONE
DRAINAGE OF GROUND WATER
ASSISTANCE IN PROCESS OF PURIFICATION
ILL EFFECTS OF WATER-LOGGED SITES

Stagnant Water

ILL EFFECTS OF
METHODS OF DISPOSAL

BUILDING CONSTRUCTION

Foundation

RELATION TO THE BUILDING
CHARACTER AND PREPARATION OF
PREVENTION OF DAMPNESS

Walls

MATERIALS USED
CONSTRUCTION

Floors

SANITARY REQUIREMENTS
MATERIALS USED
CONSTRUCTION

Roof

MATERIALS TO MEET SANITARY REQUIREMENTS
FIREPROOF
HEAT CONDUCTION THROUGH

House Dampness

OBJECTIONS TO
SOURCE OF DAMPNESS
METHOD OF PREVENTION
ILL EFFECTS OF HOUSE DAMPNESS

Fireproofing

ADVANTAGES OF FIREPROOFING
METHODS USED IN FIREPROOFING
CONSTRUCTION

House Plumbing

SYSTEM OF PIPES
FIXTURES
TRAPS
SEAL
WATER TO CARRY AWAY SEWAGE

CHAPTER II

HOUSING HYGIENE

GENERAL CONSIDERATIONS

Site

From a hygienic standpoint the building site bears a certain relation to health and this should not be overlooked. This is in perfect accord with the chiropractic philosophy as to the expression of life in the body. The building site may be so unnatural as to create an environment which would draw too heavily upon the adaptative forces of the body. In this case Innate would find difficulty in maintaining a state of coördination.

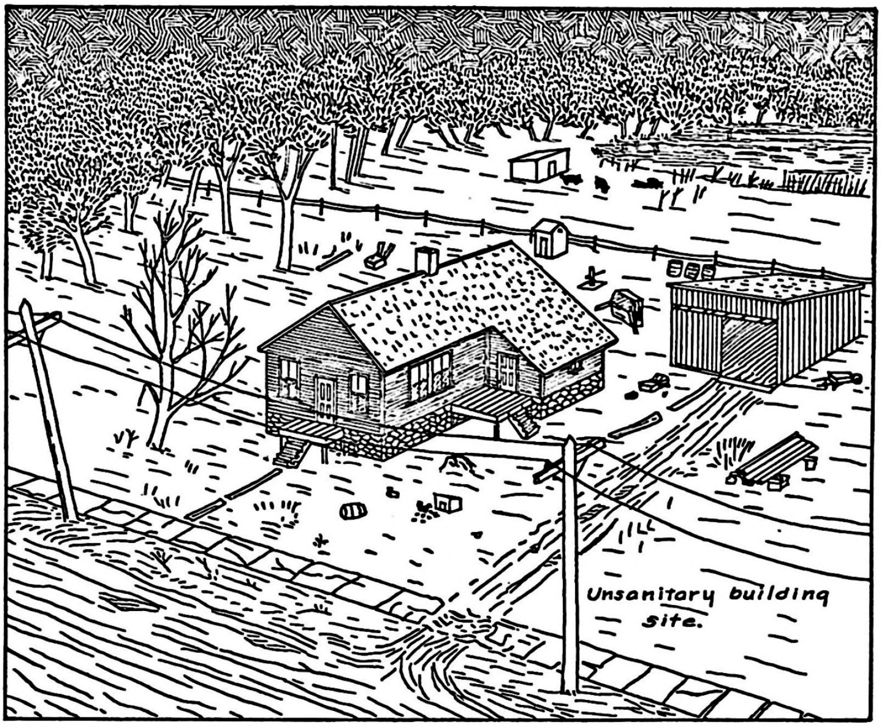
The artificial methods of living must be made to conform as nearly as possible to the needs of the body. Damp sur-

Model Site

roundings might have no ill effects upon the individual who was living a very active life outdoors "roughing it," but place that individual in a damp, poorly lighted and poorly heated house where he is less active and his expression of life will

be materially affected. Innate requires a proper environment, although not necessarily a perfect one, but it must be such that an adaptation can be maintained.

If the building site is damp it will require special methods to prevent the dampness from entering the house. This is expensive and if the site is too humid such a method will



prove highly unsatisfactory. If the location is cold the house is very likely to be cold. The site should be well adapted to the needs of the building.

Aspect

The importance of the aspect should not be overlooked. A southeasterly facing is generally considered best, because

it is dry and mild and has the morning sun and yet is not exposed to the hot afternoon sun.

The main living rooms should be so arranged as to admit the direct rays of the sun some time during the day. This can best be accomplished when these rooms are on the southeast. Each room should be so arranged with respect to window space that there will be ample lighting and proper ventilation of the whole house. Care must be exercised, however, that there is not too much window space which will give excessive heat in summer or too much cold in winter.

In large dwellings there is a tendency for the halls and stairways to be poorly lighted and poorly ventilated. This should not be. Ample provision supplying light through windows, and ventilation from the outside should be made to insure plenty of light and air.

Bedrooms should be well lighted and if possible direct sunshine should be admitted some time during the day, preferably in the morning.

Soil

The soil bears a close relation to health. The porous soils such as sand and gravel are considered the most healthful because they are driest. But there are objections to these, since they are easily polluted by leaky drains and cesspools, and are capable of holding a notable volume of ground water and ground air. Such air is almost invariably impure. The rain percolates through the soil until it reaches an impervious stratum which prevents it from penetrating any further, and it is held in the interstices or interspaces of the soil and forms the ground water.

Ground Water and Ground Air

There is a certain fluctuation of ground water and ground air. As the water rises the air is forced out of the ground, and as it recedes air is drawn in to occupy its place. There

are other factors which influence the ground air, such as the perflating action of the wind and certain climatic changes. Thus the ground may be spoken of as breathing.

If the ground water is near the surface the ground air will be noticeably moist and will produce a dampness of the atmosphere which will result in a decided cooling of the air by evaporation. If the ground water is deep the ground air will be comparatively dry, although the ground near the surface is generally moist owing to the capillary attraction and evaporation from the surface of the ground water. For this reason it is important that damp soils be properly drained to permanently lower the level of the ground water. This may be accomplished by properly laid tile. This will reduce the fluctuation of the ground water since it will be carried off when it rises to the level of the drains. In this way the ground air will not be forced out into the breathing zone to pollute the atmosphere.

The ground air is impure due to the organic matter in the soil. This organic matter is decomposed by microörganisms that feed upon such material and break it up into simpler combinations, carbonic acid, ammonia and water. These processes of fermentation and decay result in a purifying action converting the complex organic matter into products which growing vegetation is capable of assimilating. The presence of oxygen, moisture and warmth is essential to the proper execution of these processes. We can thus see that ample provision has been made for the natural purification and utilization of animal and vegetable matter. Nature provides the oxygen in the ground air, the necessary moisture is derived from the ground water and the temperature of the earth is generally sufficient to supply the needed warmth for this natural process of purification.

If the ground water rises too near the surface or if the building site is water-logged, the water may be drawn off by means of a subsoil drainage. This will also prevent fluctua-

tion of ground water, for as this water rises the ground air is forced out and causes the atmospheric air to become damp. This brings about a cooling of the air. The moisture will ascend by capillary attraction into the walls of the houses; in the evaporation from the inner surfaces, heat will be absorbed from the surrounding objects and this will cause the houses to become damp and cold.

This drainage may be accomplished by placing unglazed porous tiles with the ends in apposition, but not jointed in the subsoil. The fluctuation of ground water is of little consequence in itself; but we can see that in this way the water in wells may become polluted, impure ground air may be forced into houses, and dampness may thus be produced.

Stagnant Water

Stagnant water favors the breeding of mosquitoes and the development of certain dis-eases, malaria and cholera for example; hence the necessity for proper drainage. Trees are sometimes planted in such districts and they, together with the subsoil drainage, render the conditions more healthful. The trees and other vegetation in hot climates absorb the water from the ground and then it is evaporated from the leaves and in this way soil is made drier.

BUILDING CONSTRUCTION

Foundation

In the building of a house the foundation must receive just consideration. As the foundation holds the entire structure, such material must be used as to give adequate support to this weight. Care must be exercised in the evacuations that the basement be protected from dampness and that the entire site beneath the foundation be properly drained. The ground water should be ten feet beneath the surface of the site.

It is recommended by some hygienists that the basement floor be of cement six inches thick to prevent the entrance

of ground air and moisture. This should be covered with a wood floor.

The preparation of the foundation is comparatively easy where the ground is solid, but if the site be water-logged, marshy, quicksand, or entirely under water, its preparation then becomes a problem that may baffle the best engineers. Artificial foundation beds may have to be resorted to. These are accomplished in several ways. One very common method is to drive wooden piles into the ground, saw off the tops and construct the foundation on these piles. Another method is that of the cofferdam.

The foundation having been properly prepared, care must be taken that the footings or base course of the walls are of sufficient strength to bear the weight of the superstructure. The footings should be of stone or concrete and should be a little thicker than the walls.

Precautions for a dry basement must also be considered. This subject will be discussed under House Dampness.

The air of the basement must be kept pure by proper ventilation, since it is being constantly drawn up into the house. This will receive some attention in the chapter on Ventilation.

Walls

The walls of the house may be of brick, stone, timber or concrete. The method of construction will depend upon the material used. If timber is utilized the security of the walls will be governed by the timber posts, sills and plates. The materials used should be as little absorbent of moisture as possible. All wood should be well seasoned.

Floors

In order to meet all sanitary requirements the "floors must be secure and proof against air, dust, sound, vermin, fire and water." But it is not often that the floors meet all these

sanitary demands. Ordinary floors are made of hard boards tongued and grooved, tightly fitted and laid upon joists placed about one foot apart; the under surface is lathed and plastered to form the ceiling of the room below, or some sort of patent ceiling may be used. However, there is great objection to the space thus left between the floor and the ceiling, as it becomes a receptacle for dust and greatly endangers the spread of fire.

It is better, according to sanitary demands, to have the floor of reinforced concrete, or the space within filled with mineral wool or asbestos; or the floor may be made of steel beams encased in terra-cotta with interspaces made of concrete.

Roof

For roofing some nonabsorbent material is best. Wood shingles are possibly the most common in this country, although they are rapidly being replaced with composition shingles. The wood shingles are somewhat absorbent and are inflammable. Slate and tile are also used. The slate is a good conductor of heat, and is hot in summer and cold in winter. Tiles are heavy but are warm in winter and cool in summer. Lead, zinc and copper have all been used, but they are good conductors of heat and for various other reasons are not exactly desirable. The best method of preventing too rapid conduction of heat is to have an air space between the roof and the ceiling of the top floor.

House Dampness

Great care should be exercised to prevent the entrance of moisture into the house. A damp house is very objectionable. In a newly constructed building there is always more or less dampness coming from green lumber, mortar and plaster. This is known as building water. Before a new house is occupied it should be thoroughly dried by a fire in stoves or furnaces. Dampness from building water is only temporary and easily eliminated.

Moisture in houses from damp sites, leaky drains, porous building material which admits rain and other similar causes, require the attention of an engineer who understands water-proof construction.

Moisture from the ground water may ascend the walls of the building by capillary attraction. This may be prevented by properly draining the site and by placing a horizontal water-proof course in the walls. This may consist of asphalt one-half inch thick or a course of slate or other material through which the moisture will not penetrate.

The ill effects of a damp house upon the health of the occupants can hardly be overestimated. Such houses are cold, being difficult to heat and ventilate. The bodily heat is too rapidly withdrawn. This necessitates adaptative action on the part of Innate Intelligence and requires an unnecessary expenditure of internal energy.

Aside from a damp house having an ill effect upon health by creating an environment which is not conducive to the expression of life indoors, the dampness tends to produce moulds and otherwise injure the furniture and hangings. This results in a musty odor and creates a condition conducive to the development of cockroaches and water bugs. These conditions are repulsive to the finer sensibilities.

It is a recognized fact that Innate Intelligence is able to adapt the body to various conditions and people who appear to be in a state of comparatively good health may be found in such environments, but why should we force Innate to adapt the body to such adverse conditions when we may educationally improve the surroundings and make them more healthful? The educated mind is the expression of the same Innate Intelligence that is adapting the body to the environment, so it is only reasonable that the educated mind should be used in as intelligent a manner as the Innate mind. It is the function of the educated mind to bring about an educated adaptation to the environment through the educated body and

to study the laws of nature and adapt them to the needs of the body.

So it is in perfect accord with chiropractic philosophy that a proper dwelling be provided wherein the condition is such that there may be perfect adaptation to all the needs of the body. This is as much a part of the chiropractor's work as is any other part of his duties and obligations to the sick. He need not be able to do all these things, but he should know what conditions are conducive to the expression of life in the body and why others are not.

Fireproofing

The expression, fireproof, is a misnomer. There are no materials that are absolutely fireproof, but there are many that are fire resisting. A material may be ignition-proof but not capable of resisting high temperatures. Some metals will withstand higher temperatures than others.

Fire protection is important from the standpoint of hygiene, since it is a factor in preventing loss of life and property. It will also be observed that fire-resisting material and fireproof construction is more sanitary than soft absorbent materials and improper house construction.

Three methods are used in reducing the danger from fire: First, by the use of fire-resisting building material; second, by proper fireproof construction; third, by providing ample fire escapes and fire extinguishers.

In a fireproof building all inflammable materials are eliminated and such materials as brick, reinforced concrete, stone and burnt terra cotta are used. As has been stated before, these materials are not fireproof but only fire-resisting. They will all be affected by fire if the intensity is great enough.

In the construction of fireproof buildings, only fire-resisting materials are used. No wood nor other combustible materials are utilized. All spaces, air wells and air shafts are eliminated as far as possible. The floors are constructed of rolled wrought

iron on steel floor beams, or of Portland cement. The roofs are made of burnt terra cotta, rolled wrought iron or cement.

The stairways and landings are of brick, stone, cement, iron or steel, all wood being eliminated even for windows and doors. The partitions are constructed of fireproof material such as hollow tile.

Every building should be provided with ample fire escapes to furnish plenty of exits in case of fire. This is accomplished by providing wide stairways and by furnishing sufficient fire escapes on the outside of the building. These fire escapes should be constructed of metal or some fire-resisting material.

House Plumbing

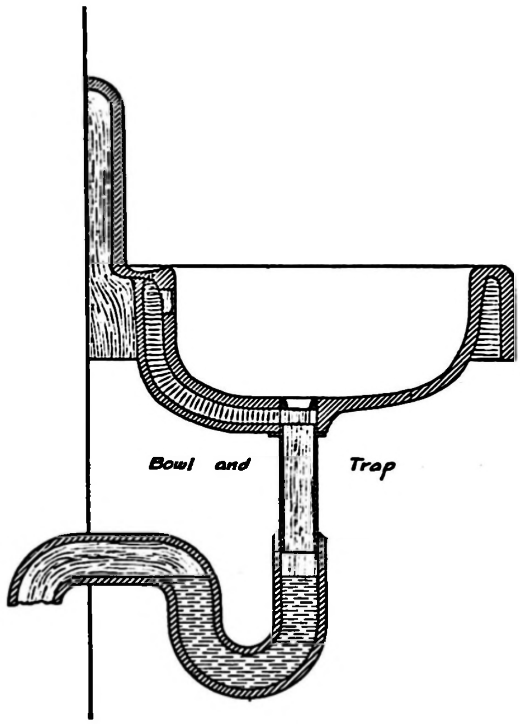
A system of house plumbing consists of pipes carrying the water into the house, the fixtures or receptacles which are used to receive the waste and refuse from the household and the processes that are performed in the house. The latter includes the fixtures of the bathroom—the stool, bath tub, lavatory and foot tub; those of the kitchen such as the sink; those of the laundry; and the system of pipes which carry the refuse from the house into the main sewer.

Between the pipes which carry the water into the house and those which carry the sewage out are placed the house fixtures. There is a pipe leading to each fixture which carries the water to dilute the sewage, and a pipe leading from each of these fixtures carrying the sewage to the main house drain. The admission of sewer gas into the house through the fixtures is prevented by the trap which contains water known as the seal. The trap is of no value unless it is properly sealed. The trap is simply a bend in the pipe, as shown in the illustration, in which water is contained. This water keeps the sewer air from coming back into the house.

A system of house plumbing, in order to meet the requirements of hygiene, must be properly trapped. There is a small

trap for each fixture and in some cities an additional outside trap is required which protects the entire system.

When some fixture loses its seal then there is great danger of sewer air coming into the house. The main causes for traps becoming unsealed are: the forcible ejection of the seal by the momentum of the flush; loss of seal through siphon; the



evaporation of the water when the fixture is not in use; and by capillary attraction as when waste paper or some similar material is left in the trap and projects through. Siphonage is caused by a large volume of water passing down through a vertical pipe with which the fixture is connected.

The loss of the seal by evaporation may be prevented by frequent use of the fixture, or if the fixture is not to be used

for some time the trap may be filled with oil or some substance that will not evaporate. The loss of the seal from momentum may be averted by providing proper flushing tanks, while the protection from capillary attraction may be effected by not allowing anything to remain in the trap which will exert this capillary attraction on the water in the trap.

Prevention of siphonage is accomplished by providing proper ventilation for each trap so there may be a column of air which may be drawn upon in lieu of the seal.

Care should be taken that the seal does not become foul. The fouling of the seal is the result of back pressure from the sewer and may be avoided by providing a vent pipe through which the air may pass from the sewer and thus relieve the pressure on the seal.

The sewage is carried from the house by the house sewer into the street sewer, from the street sewer into the district sewers, and then into the large trunk sewers. There are also relief sewers, storm sewers, under drains, and intercepting sewers. The entire system is known as the sewerage system.

The amount of water required to carry away the sewage varies in different cities. In the smaller towns it may be as low as fifty gallons a day per capita, while in some of the larger cities it may be as much as 200 gallons per capita per day.

At one time the sewer gas was considered the greatest menace to workmen in the sewers. But it has been found that there is little danger from this gas. Sewer air is very objectionable because of the very foul odor, but even those who contend that germs cause dis-ease maintain that there is little danger of contracting dis-ease from breathing sewer air.

CHAPTER III
AIR

AIR

CONSTITUENTS OF AIR

General Considerations

AIR, MIXTURE OF GASES
ATMOSPHERE
AQUASPHERE
PETROSPHERE
FUNCTION OF AIR

Oxygen

PER CENT OF OXYGEN
USE IN BODY
AMOUNT REQUIRED VARIES

Nitrogen

MORE IMPORTANT TO PLANT LIFE
USE IN BODY

Argon

MEANING OF NAME
AMOUNT IN ATMOSPHERE
ARGON GROUP

Carbon Dioxide

AMOUNT IN AIR
SOURCES OF
PROPERTIES OF
COURSE IN BLOOD

Ozone

NOT CONSTANT ELEMENT
WHERE FOUND
HOW FORMED

Ammonia

HOW PRODUCED
WHERE FOUND

Other Constituents

HYDROGEN PEROXIDE
HELIUM
KRYPTON
NEON
XENON
NITROGEN AND SULPHURIC ACID

AIR PRESSURE

Normal Air Pressure

AVERAGE PRESSURE
INTELLECTUAL ADAPTATION

Reduced Air Pressure

INCREASED RATE OF BREATHING
EXPERIMENT
SYMPTOMS IN REDUCED AIR PRESSURE

Increased Air Pressure

CONDITIONS IN SAME
DANGER FROM

Caisson Dis-ease

SEVERE PAIN IN MUSCLES AND JOINTS
DIVER'S PALSY
BENDS

HUMIDITY AND TEMPERATURE OF AIR

Humidity

RELATIVE
ABSOLUTE

Cold Dry Air

ADAPTING BODY TO CHANGE
HEAT STROKE
HEAT EVAPORATION NECESSARY

Warm Moist Air

INTERFERENCE IN ADAPTATION
EFFECTS UPON BODY

Cold Damp Air

PRODUCES CHILLING OF BODY
INTERFERES WITH INTELLECTUAL ADAPTATION

Warm Dry Air

VERY DESIRABLE
LOSS OF MOISTURE FROM BODY

Proper Temperature and Humidity

CHAPTER III

AIR

CONSTITUENTS OF AIR

Air is a mixture of gases, not a chemical compound, which envelops the earth and it is estimated to be at least one hundred miles high. This gaseous envelope is known as the atmosphere. The water upon the earth's surface is called the aquasphere. The solid substance composing the earth is known as the petrosphere.

Air performs a very important function in the interchanging of gases in respiration and in the regulation of bodily temperature. The gases contained in the atmosphere are given by most authorities in the following proportions, per volume:

Oxygen	20.93%
Nitrogen	78.10%
Argon	0.94%
Carbon Dioxide	0.03%

With traces of helium, krypton, neon, xenon, hydrogen, ammonia, ozone and hydrogen peroxide.

It is also found that there is a varying amount of water in the air, as well as dust and other substances. It is worthy of note that the air maintains a wonderful uniformity of composition over the entire surface of the earth. This is undoubtedly due to the fact that the atmosphere is in constant motion which maintains its proper mixture. It must also be noted that the air is not a chemical compound but is a mixture of gases.

Oxygen (O)

Probably the most important element in air is the oxygen which represents about one-fifth of its composition. This

percentage is maintained with very slight variation; for instance, the percentage of oxygen in towns will be slightly less than 20.93%, about 20.87%.

When the atmosphere contains only 11% or 12% of oxygen it becomes dangerous, and death results when the percentage gets as low as 7.2%. A candle will not burn with the oxygen at 16%. Slight variation in the amount of oxygen is of no special importance.

The amount of oxygen in the air has little to do with the amount absorbed in respiration, as this is governed more by the need of the body than by the amount taken into the lungs.

Nature has made a wonderful provision in the protection of the body from extreme changes in the amount of oxygen in the air. This provision increases the degree of intellectual adaptation which is possible in the body. This is shown by the fact that there is a larger amount of oxygen contained at all times in the lungs than is required to supply the red blood cells. It is maintained that the alveolar air contains normally 16% of oxygen. The red blood cells are practically saturated with oxygen as they leave the lungs; however, this amount of oxygen may not be needed by the tissue cells which the red blood cells supply and the amount they absorb upon their return will depend upon what they have given off to the tissue cells.

It can readily be seen that the air in the lungs at no time contains the full percentage of oxygen, since one at no time completely exhales the entire amount of air. In this way the residual air loses some of its oxygen and collects carbon dioxide.

Animal life is sustained by the oxygen in the air while the carbon dioxide is essential to plant life. The oxygen is carried into the lungs during the inhalation which is produced by the expression of Innate Intelligence through the organs of respiration. The oxygen passes into the blood and

is combined loosely with the hemoglobin of the red blood corpuscles; then under the direction of Innate it is carried to all the tissue cells of the body. Here the oxygen leaves the blood and is used in the oxidation which is necessary in the metabolism of the body.

The amount of required oxygen varies with different conditions that obtain in the body and is dependent upon age, the activity of the individual and his condition of health. Some authors assert that the average person will inhale about thirty-four pounds of air in twenty-four hours. This would mean a little over seven pounds of oxygen. Only about one-fourth of the oxygen inhaled is absorbed; therefore, according to these figures the individual would absorb on an average of about two pounds of oxygen in twenty-four hours.

Nitrogen (N)

The nitrogen in the air is of more importance to plant life than to animal life. It is of little significance from a hygienic standpoint, yet it is an important constituent of all matter containing protein. Nitrogen tends to regulate or influence the rate of combustion by diluting the oxygen in the air. Respiration does not seem to affect the amount of nitrogen in the air as there is no noticeable difference between the amount of nitrogen in the inspired and expired air.

Argon (A)

In 1894 Lord Rayleigh and Prof. William Ramsay discovered a gaseous substance in the atmosphere which had no chemical affinity. They gave this element the name argon which means in the Greek, "inactive." So far as is known argon will not combine with any other element.

The atmosphere contains about 0.94% argon, but so far, according to Rosenau, it has not been demonstrated in the body. Argon has no hygienic significance. Helium, krypton, xenon, neon and argon form what is known as the argon

group, since they will not unite with other elements to form compounds. These elements are all found in very small quantities in the atmosphere.

Carbon Dioxide (CO_2)

Carbon dioxide is a gas, a very small amount of which is found in the atmosphere. About 0.03% is ordinarily expressed. This means there are three parts of carbon dioxide in 10,000 parts of atmosphere. This is a very small percentage, but when we consider the enormous bulk of atmosphere we appreciate the fact that the total amount is beyond our comprehension. It is claimed that there is more carbon in the atmosphere in the form of carbon dioxide than there is in all other forms on the earth.

In densely populated areas there is a slight increase in the amount of carbon dioxide. It may reach 0.04% or even 0.05%. There is also likely to be more carbon dioxide in the air close to the soil than there is a few feet above. This is because the processes going on in the soil tend to produce this gas and hence the soil air contains a larger percentage. The air receives its carbon dioxide from such sources as respiration, fermentation, from chemical action in the soil, from mineral springs, and from oxidation of organic matter.

Carbon dioxide is a transparent, odorless and colorless gas. It is a very important constituent in the atmosphere and a very slight variation either in its increase or decrease will vitally interfere with both animal and vegetable life. Green plants in the sunlight absorb great quantities of carbon dioxide and give off oxygen. The body obtains its carbon from the food that is taken in while the oxygen is obtained from the air that is breathed. It is maintained that one acre of ordinary tree land will withdraw as much as four and one-half tons of carbon dioxide from the air in one season. Carbon dioxide is also absorbed by water; hence the oceans and other large bodies of water perform a very important function in

this respect. In certain localities, such as industrial centers, a very large amount of carbon dioxide is given off into the air; but this is quickly taken up and thoroughly mixed with the atmosphere by the constant motion which is maintained by the varying temperature, air pressure and other involved factors. It is not allowed to accumulate in any one place in larger amounts than normal. In this way the proportion is kept the same at all times.

Hygienists maintain that the regulation of breathing is largely dependent on the concentration of carbon dioxide in the air cells of the lungs. This, however, is not true since the process of respiration is not a question of chemical action nor the influence of any chemical element in the lungs or in any part of the respiratory system. The breathing, like all other functions of the body, is under the direct control of Innate Intelligence within the body.

Innate Intelligence, recognizing the need for more oxygen in the tissue cells, will bring about an intellectual adaptation by increasing the respiration. This does not take place, however, until the need has exceeded the already adaptative possibility when the reserve amount of oxygen contained in the residual air in the lungs has been exhausted.

In inspiration the air is taken into the lungs and the oxygen is taken up by the hemoglobin of the blood as before stated; then the oxygen is given off to the tissue cells. The hemoglobin absorbs the carbon dioxide from the tissues and it is then carried back to the lungs where the process is reversed. That is, the carbon dioxide is given off and the oxygen is absorbed by the hemoglobin.

The carbon dioxide which is carried to the lungs by the venous blood escapes into the air cells. The resistance which it meets here depends upon the percentage of carbon dioxide present in the alveolar air. Normally the percentage of the carbon dioxide in the alveolar air is maintained at a pressure of about 5% of an atmosphere. If the pressure becomes less

than this Innate Intelligence will adapt herself to this condition by decreasing the respiration until the normal percentage is again attained; or if the pressure goes above normal Innate will increase the rate of respiration until the amount of carbon dioxide has been decreased in the alveolar air, for this poisonous gas must be eliminated. This shows how Innate at all times is working in an adaptative way to maintain equilibrium in the body.

Ozone (O_3)

Ozone is not a constant element in air, although of such potency that a very small amount may be of great importance. In centers of population it is usually absent. In thickly wooded sections and at sea it will be found in large quantities, but even here only traces will be found. It is thought to be formed by the friction of the sea water against the air in connection with the respiration of vegetation. It is also formed in nature by electric discharges during storms.

Ammonia (NH_3)

Normally there is only a trace of ammonia in air. It is produced by the decomposition of organic matter. This accounts for the larger amount being found in the air near the ground. Ground air may contain ammonia in sufficient quantity to be perceptible to the senses.

Other Constituents

Hydrogen peroxide is a very active oxidizing agent. Rain water and snow contain very small traces of it. Hydrogen peroxide is not constant in air, but may be found in very small quantities.

Air also contains small traces of helium, krypton, neon, xenon, which have no important bearing from a hygienic standpoint. Nitric, sulphuric and other acids will at times be found in the atmosphere. These acids are formed prin-

cipally from industrial processes and will, therefore, be found near industrial centers, rather than in the open country or at sea.

AIR PRESSURE

Normal Air Pressure

Ordinary air pressure on the surface of the earth at sea level is, in round numbers, fifteen pounds to the square inch. It has been found that the average sized man is exposed to about 34,000 pounds of pressure. This pressure may be increased or decreased, and if the change takes place gradually so that Innate Intelligence will have time to adapt the body to the change, no harm will result. There is a limit, however, either in a decrease or in an increase of pressure to which the body may be adapted.

This intellectual adaptation obtains in every tissue cell of the body as well as in all of its secretions and chemicals so it can be seen that any sudden change in the atmospheric pressure will disturb the equilibrium of the entire body.

Reduced Air Pressure

When the atmospheric pressure is decreased it has the same effect on the individual that the breathing of rarefied or diluted air has. In this event the adaptation consists in an increased rate of breathing. It is also asserted that the number of red blood corpuscles is increased, which in turn increases the capacity of the blood to carry oxygen. In the diminished air pressure there is a marked decrease in the amount of oxygen absorption and this accounts for the increase in the respiration and quickened pulse rate.

As previously stated, if the change from a normal air pressure to a greatly decreased pressure takes place gradually, thus giving Innate sufficient time to bring about an adaptation, man will be enabled to live in a healthy state in a rarefied air. As the altitude is increased the air pressure is

decreased. This is because there is less air above to exert pressure. Naturally the air near the earth has the greatest weight above it to exert compression. The air pressure decreases gradually until, it is assumed, it is gradually thinned into a perfect vacuum. If oxygen is added to the air it is possible to maintain life at a remarkably reduced air pressure. A bird was kept alive by P. Bert in oxygenated air at a pressure of 0.1 of an atmosphere.

The symptoms produced in diminished air pressure will vary with the general conditions of the individual. People suffering from cardiac disturbances will be affected most by high altitudes. This is possibly the first symptom to be manifested in rarefied air. If there is any inclination toward heart weakness it will be observed when the air pressure is decreased.

The effects of reduced air pressure will vary with circumstances. There will be increased and deep breathing, with an increase in the pulse rate. There is likely to be dizziness and ringing in the ears. The sense of hearing, of sight and possibly of sensations, become impaired. There may be drowsiness and the patient may have a strong desire to sleep. The intellectual faculties become dull. Where the change has taken place very suddenly to the decreased air pressure there will be syncope, dyspnea, dizziness, nausea and weakness. These symptoms are commonly known as mountain sickness.

Increased Air Pressure

The greatest air pressure in nature is at sea level. Even the increased pressure in the deepest mines is so slight that it has no physiological significance; hence man is exposed to increased air pressure only under artificial conditions. This subject will be referred to again under the head of Industrial Hygiene.

Some of the conditions under which man is exposed to increased air pressure are, for example, divers in diving bells

and diving suits, and caisson workers. At a depth of ten meters of water the air in a diving bell is compressed to one-half its original bulk, and as a result the pressure of air is doubled. At thirty meters, or about 100 feet, the pressure is quadrupled, exposing the diver to four atmospheres or about sixty pounds per square inch.

The danger in increased air pressure is not in going from a normal pressure to a high pressure, nor does the danger come from the high pressure. The danger is not from the compression, but rather from the decompression. The individual must be brought from the increased air pressure to the normal air pressure very gradually, allowing Innate sufficient time to adapt the body to the normal pressure of fifteen pounds to the square inch. If this is done no great amount of harm will result, although there are some men who are not able to withstand these changes. This shows a lack of intellectual adaptation through the body on the part of its Innate. In an experiment P. Bert exposed dogs to an air pressure of ten atmospheres, or about 150 pounds to the square inch, and then released them very gradually, producing no ill effects.

When the air pressure is increased it results in an increase in the absorption of the gases of the atmosphere. There is an increased amount of oxygen taken up by the blood and the tissues absorb large amounts of nitrogen. When the pressure is released slowly these gases gradually escape from the lungs and no bubbles will be formed.

During compression the symptoms are not so severe as those during and after decompression. During compression the symptoms are a deepening but slowing of the respiration, a slowing of the pulse rate, and an interference in evaporation in the water vapor. The increased pressure on the ear drums will cause pain in the ears and sometimes the ear drums rupture. There may be an alteration in the voice, headache and dizziness. However, in a short time, intellectual adapta-

tion takes place and equilibrium is established by the internal change and there is at least temporary relief from these symptoms.

Caisson Dis-ease

The greatest risk to health and life occurs during the time the individual is coming from the high to normal pressure after the decompression has entirely taken place. This may produce a condition known as caisson dis-ease. It may be several hours after the workman has been taken from the decompressing chambers before the symptoms appear. Gradual decompression is the only thing that will prevent the manifestation of these symptoms. When the workman shows any symptoms of caisson dis-ease he should be rushed back into the compression chambers and kept there a short time until Innate has a chance to establish equilibrium in the pressure of the body, and he should then be taken very gradually through the decompression chambers.

The symptoms that appear after decompression are vertigo, nose bleeding, nausea and vomiting. The most common symptom is the severe pains in the muscles and joints which is known by the layman as bends. There may also be temporary or permanent paralysis called diver's palsy. In the more severe cases there will be unconsciousness, and even death.

When the workman is taken too quickly from the high pressure there is formed gas and air emboli. These may form in the labryinth of the ear, in the spinal cord, in the brain, in the heart, or in any other vital part of the body and not only be distressing but may even prove fatal.

It must be remembered that the conditions produced by changes in the air pressure may be classed as traumatic, immunity from which is not entirely a question of uninterrupted transmission. If there are subluxations in the spine at the time the workman goes into the caisson, or if subluxations are produced at the time of decompression, the interference

thus produced will interrupt the process of intellectual adaptation. Such subluxations should be adjusted, but it must be remembered that if emboli are formed or if bends occur the result or the relief is a question of the natural processes of Innate in the body, and the results will depend entirely upon the ability of Innate to cope with the traumatic condition. Innate Intelligence operates through the body according to law, and it is possible for the body to become so affected and deteriorated that it becomes a physical impossibility for her then to repair it and restore it to normal.

We have seen that the normal air pressure at sea level is fifteen pounds to the square inch. In order that the body will not be crushed by this weight it is necessary to have an internal resistance to equal this weight. This internal resistance is maintained in the body by the tone of all of its parts; it is maintained by the expression of mental impulses in the tissue cells.

We have also observed that the combining of chemicals is influenced by the pressure exerted; therefore, in order that the chemical combinations of the body be constant there must be equilibrium established between the external pressure and the internal resistance. This is maintained through the adaptability of the expression of Innate in the body. As the change takes place externally there is a corresponding adaptative change taking place internally and this all requires time. Therefore, in passing the body from one air pressure to that of another degree, there must be a sufficient amount of time intervening to allow Innate Intelligence to bring about the necessary adaptation.

The changes that take place under differing degrees of air pressure are not purely the result of chemical changes in the body as is maintained by some, but in all these processes we see the evidence of intelligent action which we believe is the result of the reasoning of the intelligence in the body. One evidence of this is that when the workman is brought

gradually from an increased air pressure to the normal air pressure the gases that have been absorbed by the tissues under the abnormal condition will be given off through the normal channels, and less injury will be done. It is interesting to note that in Nature, man is not exposed to a greater air pressure than that at sea level; it is only under artificial, man-invented environments that the body is called upon to withstand a greater pressure than the normal. It may also be noted that without the inventions of man it requires quite a little time for man to be transported from the air pressure at sea level to that of the higher altitudes as on the mountain tops. This gives Innate Intelligence an opportunity to bring about an adaptation to this change, since the change in the pressure takes place so gradually. But with man-made inventions, such as the automobile and aeroplane, one may transfer himself from sea level to great heights where the pressure is less in a very short time. This does not allow sufficient time for adaptation to take place and is much different from the slow process of climbing the mountains.

So we see that, after all, most of the necessity for immediate adaptation of the body to changed environmental conditions is the result of the work of the educated mind of man, and not the result of the laws of Nature. In Nature we seldom see the necessity for sudden or extreme adaptation. But under our present artificial means of living there are such cases, and these necessitate a study of the artificial conditions as well as a study of the Innate laws of adaptation that there may be as far as possible an educated adaptation to the environment.

HUMIDITY AND TEMPERATURE OF AIR

Humidity

Water vapor is present at all times in the atmosphere. It is the least constant of all of the air constituents, varying greatly under different conditions. The temperature produces

a greater change in the amount of aqueous vapor in the air than any other factor. There may be so much water vapor in the air that the air is spoken of as being completely saturated. This is known as absolute humidity. If there is any excess over and above this complete saturation, it is given off as dew; it is spoken of then as having reached the dew point. It must be remembered that this absolute humidity does not represent a constant amount of water vapor, for the amount of moisture necessary to produce complete saturation varies with the degree of temperature. It is erroneous to speak of the air holding water.

"As a matter of fact, the air has nothing to do with it, for it has always been clearly observed that the presence of water vapor in any given space is independent of the presence or absence of air in the same space. The amount of aqueous vapor which a space contains depends entirely upon the temperature and not upon the presence of the air."—Rosenau in *Preventive Medicine and Hygiene.*

The higher the temperature the greater the amount of water vapor in one cubic foot of air at a temperature of 10° F., while at 100° F. there would be 19.1 grains at complete saturation. Since increased temperature increases the amount of aqueous vapor and this aqueous vapor in turn absorbs heat, we thus see a reciprocal action of the aqueous vapor upon the temperature.

Absolute humidity is all of the water vapor that may be contained in the air at a given temperature. **Relative humidity** is the difference between the amount of water vapor that must be contained in the air at a given temperature to reach absolute saturation and the amount actually contained in the air at that same temperature.

If the relative humidity of the air in a room becomes as high as 85% the moisture will begin to condense and form on the walls and objects. This makes the room damp and interferes with the ventilating and heating of the room.

There is less water vapor contained in the air at high altitudes, the air being cooler. A large amount of rainfall does not necessarily produce an increase in the relative humidity. That is to say, a country with a very high average of rainfall is not necessarily a damp country so far as the atmosphere is concerned.

Cold Dry Air

Cold dry air is exhilarating and tends to quicken metabolism in the body, while warm damp air is depressing and tends to retard metabolism.

The body possesses great possibilities of adaptation to the varying degrees of temperature and humidity through the action of Innate Intelligence. With the aid of the educated mind in bringing about adaptation in the way of clothing, for example, it is possible to increase the range of temperature and humidity to which the body may be adapted.

Due to the fact that heat is being constantly formed in the body by the different processes that are carried on within, it naturally follows that this heat must be carried out of the body or it will accumulate and result in harm to the tissues, producing what is known as heat stroke. This heat dissipation is greatly influenced by the humidity, or in other words, the amount of water vapor in the air. The temperature of the air also has some influence on heat dissipation.

Cold air is made to feel colder by an increase in the amount of moisture while warm or hot air is made hotter by increasing the moisture. The reason for this is that the moisture in the cold air favors heat conduction, hence draws the heat from the body at a more rapid rate than is normal, while the moisture in the hot air hinders evaporation.

Innate Intelligence is able, through the specially devised machinery of the body, to maintain a perfect balance between heat production and heat dissipation or heat loss. Even

though the temperature of the air may rise, yet if the body is normal it will not produce an increase in the bodily temperature. Indeed, it is asserted that when the temperature of the air goes above 70° F. the bodily temperature would rise if it were not for the perspiration which Innate will produce through the sweat glands. As long as the perspiration is produced and is evaporated from the surface of the body the heat production and heat loss will be kept in perfect balance. But when something interferes with this adaptative process of Innate and the individual can not perspire, there will soon be symptoms of overheating and the temperature of the body will begin to rise.

Evaporation is decreased in an atmosphere in which the humidity is high. The reason for this is obvious; the atmosphere already filled with water vapor is slow to take up more. This is because molecules of vapor given off from the body collide with those in the air and are returned to the surface of the body as moisture. When this condition obtains there is an adaptation produced by increasing the amount of blood to the skin; this increases the temperature of the surface of the body, but allows for an increase in the heat loss by radiation, conduction and convection.

The conductivity of the atmosphere for heat is increased by an increase in the humidity; hence a cool damp air will chill the body for the reason that the conductivity is increased and bodily heat is lost more rapidly through conduction. Increased humidity interferes with the evaporation of perspiration; hence a hot, moist air is heating to the body and deprives the body of force, making the patient feel sluggish and fatigued.

There is much moisture given off from the body each day. It is estimated by Pettenkofer, Voit, Rosenau and others that the average individual under ordinary circumstances will give off through the lungs about 290 grams, and from the skin from 500 to 1800 grams daily. If this fact is kept in mind

some idea of the necessity of proper ventilation will be appreciated.

Warm Moist Air

Workers fatigue much more easily when in warm moist atmosphere. Work is done much more rapidly in cool dry air and the efficiency of the worker is noticeably raised; in warm damp air the bodily temperature rises and the pulse rate increases.

Mental and physical activities are reduced in an atmosphere of high humidity and increased temperature. This is due mainly to the reluctance on the part of the individual to put forth an effort sufficient to perform any great amount of work. There is a general feeling of languor because of the enervating effect of the air.

There is no serious injury resulting from working in such an atmosphere, unless there is an increase in the bodily temperature, and then there may be serious results to the health unless relief is obtained. When the humidity has reached the point of complete saturation and the temperature is above 88° F., compensation can no longer obtain through evaporation and heat stroke may result. The most noticeable effect of warm moist air under ordinary circumstances is reluctance to put forth any mental or physical exertion, and a loss of appetite. With a temperature at 75° F. and the relative humidity 80%, an individual not accustomed to such will require complete rest.

It will be noticed that under such conditions Innate Intelligence is constantly working to bring about intellectual adaptation and that she is able to do so to a remarkable degree. The glands of the body are used to produce secretions which constantly bathe the tissues and keep them cool in the high temperatures, and at a proper degree of warmth in the low temperatures. The fact that the individual is indisposed to mental and physical activity in such an atmosphere is adapta-

tive on the part of Innate. This inactivity is suggested by means of the languid feeling in order that the body will not be over-exercised and thus will not increase the amount of heat in the body; because under these circumstances the process of evaporation is interfered with and this is one of Innate's principal means of regulating the temperature of the body.

Perspiration is an adaptation on the part of Innate, for in this way the surface of the body is kept moist and as this moisture evaporates the body is cooled; otherwise the temperature of the body would increase with every rise in the temperature of the atmosphere. Not only does this help to regulate the bodily temperature, but it keeps the surface tissue of the body soft. If there was no perspiration, the surface of the body would soon become dry, parched and hard. The skin would become scaly and would crack and become chafed.

Because of these adaptative processes it is possible for the body to be adjusted to great extremes in temperature. The body may become accustomed to extremely high temperatures even with high relative humidity, providing the change takes place gradually and sufficient time is allowed for the processes of adaptation to take place.

It is very important that the kidneys be able to perform their normal function in order that these processes of adaptation may take place. The kidneys are important not only because of the function which they perform in the excretion of poisons, but because of the function which they perform in relation to the serous circulation. This is important because of the secretions that are involved. This subject will be treated more fully under the subject of Water.

Cold Damp Air

The body quickly becomes chilled in a cold damp air because the increase in the water vapor increases the conductivity of the air for heat. It can thus be seen that the heat

producing processes of the body must be increased in order to maintain the normal temperature of the body. As we know, all activity of the body requires an expenditure of energy, so if the body is exposed to a cold damp air for an abnormal length of time it will necessitate an increased expenditure of internal energy to meet the increased demands for heat and thus dissipate forces that should and would, under normal conditions, be utilized in the metabolism of the body. If the heat production is at a minimum in the body, which it may be, due to several factors such as old age, infancy, or dis-ease, this exposure to lowered temperature and high humidity will result in injury to the body.

An interference with the transmission of mental impulses to the kidneys resulting in a decrease in their functional activity may mean a retention of poisons in the body and produce a condition diagnosed as rheumatism, for example; or an interference with the serous circulation may result in the tissue cells being under-nourished. Both of these conditions will interfere with the processes of intellectual adaptation. Educationally, man may help in the adaptation by proper clothing and by giving attention to proper exercise.

Warm Dry Air

By far the most desirable air is the warm, relatively dry air; but as has already been noted, it is possible to have an atmosphere with a relative humidity that is too low. If the air is abnormally dry, and at the same time warm, there will be a great loss of body moisture due to the increased evaporation. When the loss of water from the body reaches 21% death ensues. In an experiment performed by Rubner and Lewaschew it was found that a man weighing about 127 pounds gave off about 54.1 grams of water in an hour in a temperature of 68° F. with a relative humidity of 82%; the same individual in a temperature of 68° F., but with a relative humidity of 82%, gave off only 15.3 grams.

Proper Temperature and Humidity

The most desirable atmospheric conditions are obtained at a temperature of 68° F. to 70° F., with the relative humidity from 40% to 60%. This is given only as a general average and will necessarily vary with many conditions, such as seasons of the year and occupation.

Moderately cool and relatively dry air increases the activities of the body, makes breathing easy and more frequent, and hence increases the circulation of the blood. Innate is thus enabled, in such an atmosphere, to bring about more perfect metabolism.

Proper temperature and humidity of the air in houses, impurities found therein, source of impurities and their effect upon health, will all be considered thoroughly under Hygienic Housing.

CHAPTER IV
VENTILATION

VENTILATION

Introduction

- VENTILATION DEFINED
- RATE OF RESPIRATION
- VOLUME OF AIR INSPIRED AND EXPIRED
- CAPACITY OF THE LUNGS
- AMOUNT OF AIR REQUIRED PER HOUR
- OBJECT OF VENTILATION

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- RESPIRATION OF PERSONS
- IMPURITIES FROM HEATING AND ILLUMINATION
- ACCIDENTAL SOURCES
- EFFECTS OF FOUL AIR

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- EXCHANGE AND CIRCULATION OF AIR
- ILL EFFECTS OF VITIATED AIR
- REBREATHING AIR
- NATURE'S PURIFICATION METHODS
- NECESSITY FOR VENTILATION

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- THROUGH WINDOWS AND DOORS
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- DEVICES REQUIRED
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CHAPTER IV

VENTILATION

Introduction

Ventilation as defined by Webster is, "To cause fresh air to circulate; to cause inside resident impure air to be removed and replaced with fresh, pure air, whether it be in building, streets, mines, or sewers."

Shakespeare speaks of sleep as "Nature's second course." Fresh air may well be called "Nature's tonic." Everything else necessary for good health may be provided, but if there is not a sufficient amount of fresh air the tissues of the body can not perform their functions. It is quite as necessary to have plenty of fresh, pure air as it is to have a proper amount of wholesome food and pure water. Ordinarily not enough attention is given the subject of ventilation, especially of the average home.

The average adult breathes at the rate of seventeen or eighteen respirations per minute. At each respiration about thirty cubic inches of air passes in and out of the lungs. The air in the lungs loses 4% of oxygen and absorbs about 3.5% to 4% carbon dioxide. The nitrogen remains the same. The temperature of expired air is raised to about 98.4% F. and contains approximately 5% aqueous vapor.

This volume of air inspired and expired during gentle respiration, which is, as has been said, about thirty cubic inches, is known as tidal air. By forced inspiration another 100 cubic inches of air in addition to the tidal air may be taken into the lungs. This is known as complemental air. By forced expiration it is possible to expel from the lungs 100 cubic inches of air over and above the 30 cubic inches of tidal air; this is known as the supplemental air. There is

another 100 cubic inches which can not be expelled by the most violent expiration; this is the residual air. The supplemental air can, by forced expiration, be expelled from the lungs, but the residual air can not. Altogether there is in the lungs during forced inspiration about 330 cubic inches of air. An average adult gives off about 0.71 cubic feet of carbon dioxide per hour.

Taking into consideration the amount of air breathed into the lungs per hour and the amount of impurities carried into the breathing zone by the expired air, it can readily be seen that the problem of supplying a sufficient volume of pure air in the house is no small problem.

The amount of fresh air needed for the average adult is estimated to be 3,000 cubic feet per hour. The ventilating system that does not provide this amount of air per hour without objectionable draughts does not meet the requirements of modern hygiene.

In a system of ventilation it is not only a question of providing a certain volume of air from the outside, but the great problem is to provide a sufficient volume of pure air of proper temperature and of proper humidity. Air that is laden with smoke, dust and suspended matter, or that which contains gas or foul odors, is objectionable and does not meet the requirements. Therefore, the source of the air becomes important. The ventilating system must also keep the air in proper circulation at a proper velocity.

The ventilating system of an ordinary building might seem a very simple proposition, but when considered carefully it is a very great problem and one that requires the careful attention of engineers trained in that particular line.

It is not the object of ventilation to provide an indoor condition identical with that outdoors, but it is to maintain a condition indoors conducive to a normal expression of indoor life. It is quite obvious that if indoor conditions were maintained identical with outdoor conditions the desired results

could not possibly be obtained, for indoor life demands a much different environment. It is necessary to give any system of ventilation as much attention as is given a heating system in order to obtain the best results. No system will work itself.

Sources of Impurities in Air

There are many processes carried on within the house that add to the impurities of the air. Such sources may be classified as follows: respiration of persons, impurities from heating and illumination, and accidental sources from processes carried on within the house, such as house cleaning and laundering.

It will be observed from a study of the amount of air inspired and expired and the impurities carried from the body in the process that one of the most common sources of vitiation of the air in houses is respiration. That these expired poisons may be diluted or carried out of the breathing zone it becomes necessary to have an adequate ventilating system. If the room is heated by a stove impurities will be added from coal dust and the dust of ashes. When the iron is overheated it gives off carbon dioxide and other gases. Open fire or an open blaze for lighting purposes consumes oxygen, gives off carbon dioxide, raises the temperature and increases the amount of aqueous vapor.

Vitiation from accidental sources consists of dust particles of organic and inorganic detritus which are added to the air from walls, floors, furniture and hangings. Other processes such as laundering will add a certain amount of poisons and suspended matter to the air. All this reveals the necessity for exchanging the inside air for pure outside air.

Requirements of a Ventilating System

A ventilating system must not only bring about an exchange of air, but it must also keep the inside air in proper

circulation during the time it is contained inside. Proper circulation of air is one of the most important functions of ventilating systems.

The value of air circulation will be appreciated when it is known that an aerial envelope is formed around the body when the air is not kept moving and the temperature and humidity of this air will resemble that of a very hot, humid summer day. The effects will also be similar to those of heat exhaustion. This shows the importance of keeping the air in circulation in order to carry away the poisons that are being constantly excreted from the skin and through the respiratory tract.

The effects of foul air are usually manifested as headache, fatigue, lassitude, vertigo, nausea, vomiting, collapse and even death. The chronic effects are anemia, debility, lowered vitality and disturbances in digestion. Prolonged exposure to vitiated air will necessitate increased adaptation on the part of Innate Intelligence. If this exposure is carried to an excess it will draw upon the adaptative forces of the body and make it more susceptible to the invasion of toxins and subject to changes which it would not be when under more natural environmental conditions.

It is now affirmed by the best hygienists that there is no great objection to rebreathing air if provision is made for diffusion of the carbon dioxide and if the bodily odors are eliminated. In this way air may be properly warmed and kept recirculating; thus there is a saving on fuel. If air is to be rebreathed it must first be washed. There is, of course, a limit to the length of time air can be recirculated. At no time is the recirculated air equal to outside air and because this method is not properly regulated and carefully controlled it is not considered safe for use.

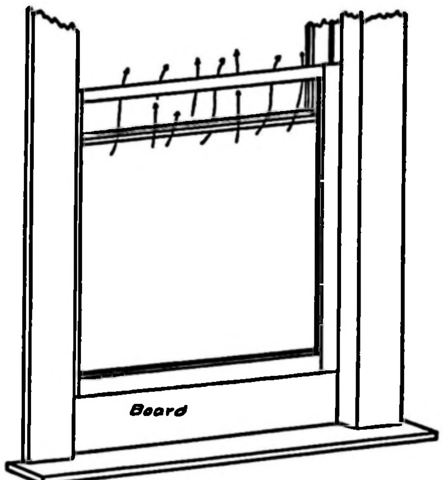
Before considering methods for obtaining pure air it is interesting to look at Nature's purifying system. The effect of vegetation upon the air is to consume carbon dioxide,

especially in the sunlight. The purifying effects of the sun's rays on the organic particles, the washing of the air by the rain which carries down the dissolved gases and suspended impurities, the natural constant diffusion of the air due to the wind, are all natural processes tending to keep the outside air in a state of purity.

Man so far has been unable to find any artificial means of purifying the air and therefore must provide means of admitting air from the outside in a state conducive to sustaining indoor life.

Natural Means of Ventilation

Outside air may be polluted with dust, smoke and suspended matter and it is then necessary to free the air of these impurities before it enters the house. Especially is

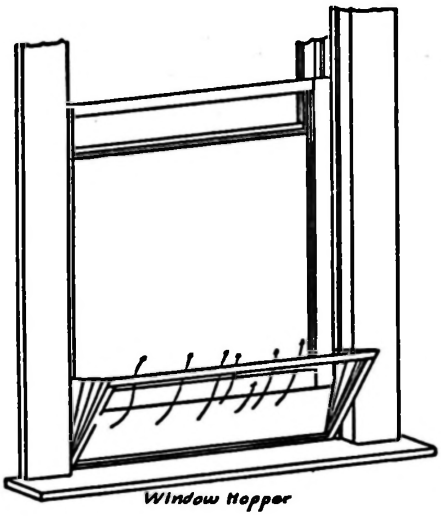


Window Ventilation.

this true in cities and where large buildings are to be ventilated. The most satisfactory methods of ventilating a large building is the plenum and the vacuum systems.

In the ordinary home, ventilation is through the natural openings such as windows and doors, although special open-

ings may be provided which will admit fresh air and carry out the vitiated air. A great deal of air is admitted through the crevice and openings around windows and doors. A very simple method of airing a room in cold weather when a direct draught is objectionable is to place a board a few inches wide and as long as the width of the window beneath the lower sash. This prevents the air from coming through the open window, but permits it to enter between the upper and lower sashes. This also has the advantage of directing the air current toward the ceiling. This is very effective in the sick room and is so simple that any one can use it.

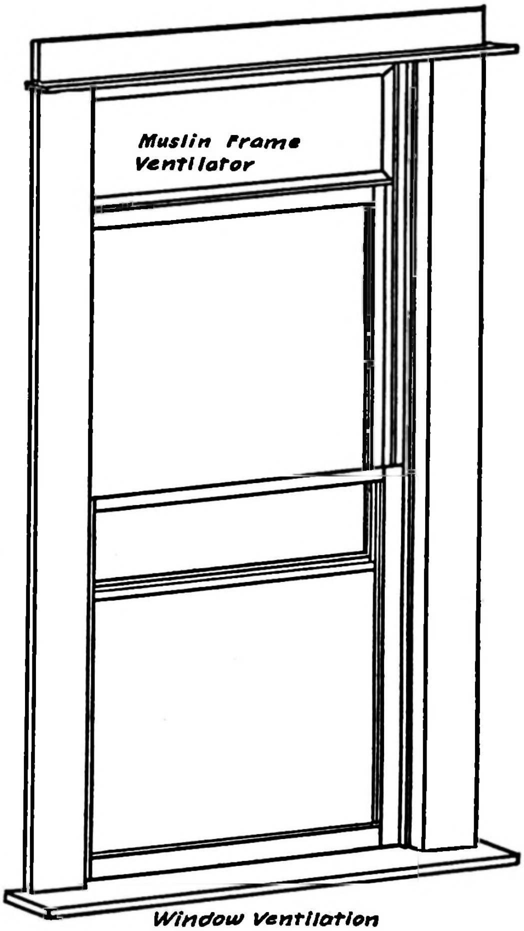


Window Hopper

The size and shape of the room to be ventilated must be taken into consideration as well as the number of persons therein. The minimum amount of space allowed for each person has been placed by various authors at from 300 to 1,000 cubic feet, depending upon the nature of the work carried on, the size and shape of the room and the type of ventilation depended upon. In hospitals where fever cases

are cared for 2,500 cubic feet are desired, while in government barracks each soldier is allowed 600 cubic feet.

The necessity for a sufficient supp'y of pure air can not



Window Ventilation

be over-emphasized. When the windows and doors are used to ventilate the house they should be thrown open at different times so that the house air may be completely changed. We must not, however, go to the other extreme and jeopardize the health of the occupants by keeping the temperature too

low, yet it has been proven that cool, fresh air is more easily heated than warm vitiated air.

When air is admitted by special ducts they should be so arranged that air may be evenly distributed over the room. The relative position of the inlets to the outlets is a question upon which the engineers are not exactly agreed. It is obvious, however, that their arrangement must admit of a complete change of air at proper intervals and that draughts will not be established directly between inlets and outlets. It is generally conceded that the best results are obtained when the inlet is placed above near the ceiling, and the outlet placed directly below near the floor. In this way there seems to be a more equitable distribution of the entering air and less likelihood of a direct draught between the inlet and outlet. The outlet should never be directly opposite the inlet, since the air will pass directly through the room and there will be very little mixing with the room air. If the room is crowded it is more desirable to admit the fresh air from beneath, but when this is done there must be a great number of inlets. In this way the fresh air is admitted more directly into the breathing zone and at the same time advantage is taken of the natural air currents in the room.

There are many patent devices on the market for ventilating through the windows. Such devices are very good and may be used to an advantage. Usually they are so built that the air is directed toward the ceiling as it is admitted. The same desired end is accomplished by placing a board under the lower sash as described above.

Mechanical Ventilation

By far the most satisfactory method of ventilating large buildings is the mechanical method. This is not practical for small buildings or homes because of the special devices that are required and the expense of operation. Mechanical ventilation may be accomplished by the plenum system, the

vacuum system, or by the combined plenum and vacuum systems. The most desirable results are obtained when both systems are used and used in connection with the heating system. Heating and ventilating are so closely related that they must be considered one with the other. A poorly ventilated room is more difficult to heat and an improperly heated room is difficult to ventilate.

The plenum system consists of a fan to force the air into the rooms. These fans are run by water motors or electricity whereby the air is forced through ducts into the rooms. This system is made necessary by the great buildings, basements and large steamships, which could not be inhabited if natural ventilation was the only method employed.

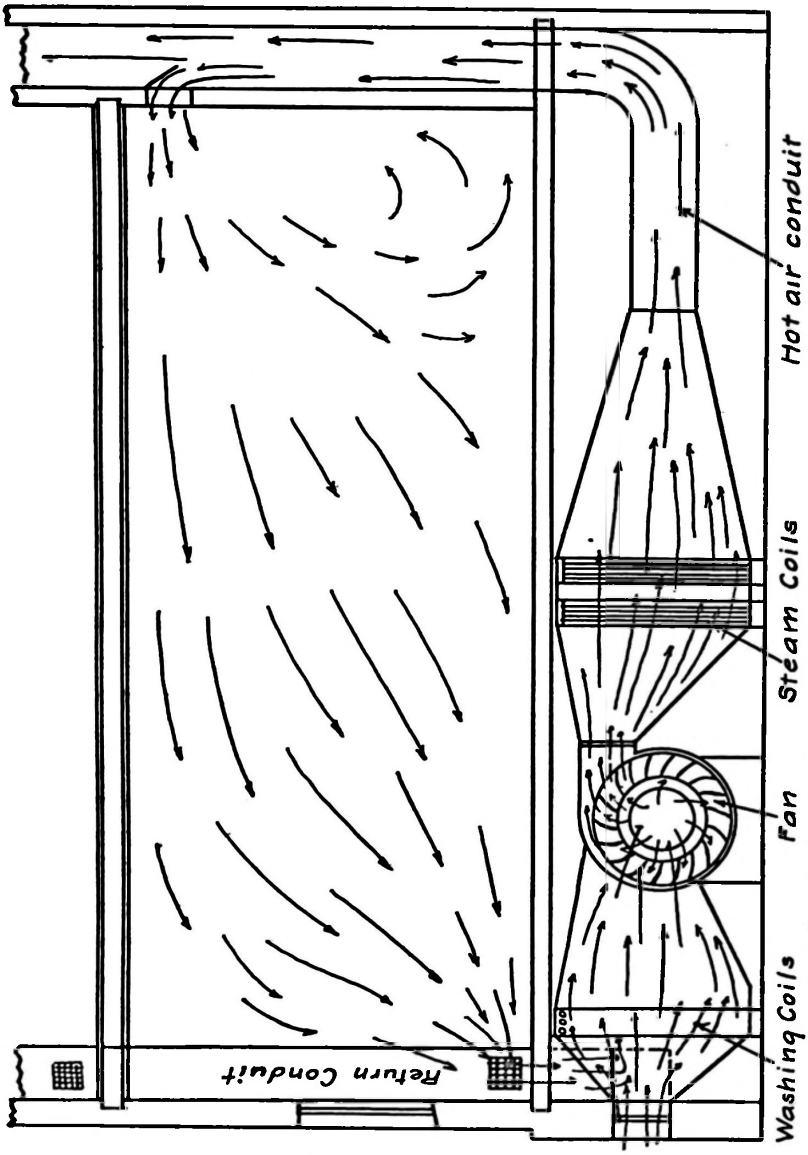
The vacuum system consists of suction fans whereby the vitiated air is drawn out of the rooms and replaced by fresh air through the natural openings. In this way natural ventilation may be made more efficient, but this method in itself is not adequate for large buildings.

The two systems, vacuum and plenum, are commonly used together and when employed in connection with the heating device the very best results are obtained. The amount of air, the temperature and humidity, and the purity of the air may be regulated to a nicety in this way.

A complete system of vacuum and plenum consists of plenum fans for forcing the air into the rooms, vacuum or suction fans for the removal of vitiated air, the ducts for conducting the air to and from the rooms, the necessary machinery to run the fans, and a proper heating system whereby the air may be warmed in the winter and cooled by ice coils in the summer. It is also necessary to have a device for washing the air.

Washing the Air

As the air is drawn into the buildings by the plenum fan it is passed through a chamber where it is washed. This is



Central Heating with washed air.

done by forcing the air through a spray of water. A water curtain is formed by forcing water through perforated pipes placed across the chamber from each other and the water thus sprayed made to intercept. As the air passes through this curtain of water many of the impurities such as dust, cinders, bacteria, some of the gases, particles of decomposition, and epithelial cells, are removed. Washing does not remove carbon dioxide or bodily odors. Washing is one of Nature's methods of cleaning the air as is seen in rain.

After the air is washed it is passed over tempering coils. In the winter the air is warmed and in the summer it is cooled in this way. The humidity is also controlled. It can thus be seen that this method, although rather expensive, is the only real method of ventilating large buildings satisfactorily.

CHAPTER V
HEATING

HEATING

GENERAL CONSIDERATIONS

Heat from Hygienic Standpoint

Combustion

Molecular Theory

Body Heat

- HOW MAINTAINED AT CONSTANT TEMPERATURE
- INFLUENCE OF BODY HEAT ON HOUSE AIR
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LOCAL HEATING

Radiation

- PRINCIPLE OF
- OPEN FIRE
- OBJECTION TO

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- HEATING BY STOVE
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CENTRAL HEATING

Convection

- CENTRAL
- HOT AIR
- HOT WATER
- STEAM

CHAPTER V

HEATING

GENERAL CONSIDERATIONS

Heat from Hygienic Standpoint

The subjects of heating, lighting and ventilating will be treated purely from a hygienic standpoint and in no sense from the standpoint of engineering. The proper manner of heating a building is not within the scope of hygiene, but becomes a question of proper engineering and a subject to be considered from that angle. We are concerned only as the heating of buildings influences the health of the occupants.

Combustion

In parts of the country where the temperature goes below 60° F. it becomes necessary to provide artificial heat to warm houses in order that health may be maintained at the least possible expenditure of energy. The most common method of producing heat for heating purposes is by combustion. Its obedience to certain physical laws is infallible. Heat is liberated from such material as coal and wood by combustion and is the result of the chemical action of this combustion; it is then transmitted to the rooms to be heated either by air, water, or steam unless the combustion takes place in the room to be heated; then it is distributed throughout the room by radiation from the open fire or conduction from above.

Molecular Theory

Up until the beginning of the nineteenth century heat was believed to be a substance that had no weight and the name caloric was given this hypothetical substance. Davy and

Rumford, through a series of experiments, proved that heat is a violent agitation of the molecules of matter. From this we have the molecular theory that as the velocity of the molecules is increased heat is produced and the temperature raised. The words heat and temperature are not interchangeable. Heat is the cause and temperature is the effect. Temperature indicates the presence of heat and the degree of temperature represents the intensity of the heat, but not the quantity. Heat in the same amount may be imparted to two bodies of the same substances, but different mass, and one will be hotter than the other; therefore, the specific heats of the two substances are different. To illustrate: Place in the sun a receptacle containing two gallons of water and one containing one gallon of water, both the same temperature. Leave them for a given length of time and they will become warm, but the one gallon will be warmer than the two, because of the difference in the amount of water to be warmed. The same amount of heat was applied to each, but this did not produce the same temperature in both. Again the same quantity of different substances may be exposed to the same heat, but the temperature will not necessarily be the same, for some substances heat more rapidly than others. It requires more heat to raise the temperature of water to a given degree than it does the same weight of any other substance, except hydrogen. This is the reason water gives off more heat than any other substance that cools through the same number of degrees.

Normal heat is produced in the body by the expression of calorific mental impulses and by the oxidation which is carried on in the tissue cells. The amount of heat produced in the body is adaptative to the needs of the body and is under the direct control of Innate Intelligence.

Air is carried into the lungs in respiration and by the action of Innate the oxygen is absorbed in the air cells and passes into the blood. It is carried in the blood by the hemoglobin

to the tissue cells where it comes in contact with the calorific mental impulses and combustion takes place.

Body Heat

The normal bodily temperature is 98.6° F. Variation above or below this point indicates abnormality. This heat can not be supplied artificially from without. It must be generated within the body. It therefore becomes obvious that the temperature outside of the body is not regulated for the purpose of supplying the body with heat. The temperature of the atmosphere must, however, be regulated in order that there may not be an abnormal loss of the bodily heat. The bodily heat is being constantly lost to the outside air as follows: 30% by contact with the air, about 43% by radiation and about 27% by exhalation and other losses. We may sit in a room that is warm enough, say 75° F., and yet if we are near a cold wall we will feel chilly. We say we feel the cold coming from the wall, while in reality we feel chilly and cold because the body is losing its heat abnormally to the cold wall by radiation through the air.

When the air is comparatively dry the equality of the bodily heat is maintained by a steady but imperceptible evaporation from the skin. In moist air this evaporation does not take place so readily since the air is already laden with moisture, so instead of the moisture being absorbed by the air it forms on the surface of the body as perspiration. This is why one perspires more in a moist air than in an atmosphere having a low humidity. When the air is kept in constant motion there is an increase both in the evaporation from the surface of the body and also in the heat conduction by the constant supply of fresh air to take the place of the moisture-laden and heated air around the body.

The normal heat given off from the body raises the temperature of the air surrounding the body and tends to create upward currents. This is Nature's method in freeing the body

from the envelope of vitiated air which surrounds it as a result of the natural processes carried on through it. Therefore, if the temperature of the room is too nearly the same as that of the body it will be necessary to make more provision for the ventilation since the temperature of the body would not be enough greater than that of the surrounding air to create sufficient movement to carry the vitiated air away from the body. That is why a cool room does not require the same amount of ventilation that a hot room does.

Innate Intelligence is capable of adapting the heat of the body to a great range in atmospheric temperature, but in order to do this there must be a sufficient length of time to enable Innate to bring about the necessary adaptative changes in the body. If the atmospheric changes take place too rapidly this adaptation cannot be effected and the metabolic equilibrium of the body will be disturbed. This makes it necessary to exercise care in properly heating our dwellings.

Proper Temperature of Building

It is certain that temperature of the dwelling should be properly regulated and that it should not vary with the temperature outdoors, especially in the winter time. The heat equilibrium of the body may be easily disturbed by sudden changes in the temperature of the dwelling. Because there is an increased expenditure of the internal energy to bring about adaptation, the internal forces are dissipated and this lowers the resistance of the body and makes the individual susceptible to incoördination.

A high temperature with a relatively low percentage of humidity will cause an abnormal evaporation from the skin and mucous membrane. This gives not only a sense of chilliness but causes an abnormal dryness of the skin and produces an irritation in the throat and nose. On the contrary, the bodily heat will be withdrawn too rapidly in a temperature that is too low.

There are many factors to consider in determining the proper temperature of a room or a dwelling. The time of year, the processes carried on within the dwelling, the use of the rooms—that is, whether they are used for sleeping-rooms, living-rooms, or workrooms—all tend to influence the degree of temperature most advantageous to the inmates of the room.

In determining the proper temperature of a room the relative humidity that is to be maintained must be considered. A hot dry air is more desirable than a cool damp air. In winter the variation in the temperature of the average dwelling should be between 58° F. and 70° F. with a relative humidity of 40% to 60%. The temperature should be lower in the bedroom than in the living-room.

The great objection to the average heating system is that the air is kept too dry; therefore, it is necessary to keep the temperature of the rooms too high in order for the individuals to keep warm.

Requirements for Heating System

In order for a system of heating to meet the demands of hygiene there must be a minimum cost of production and absence of impurities produced in the process of heat; the heat must be equitably distributed over the house; the temperature must be kept even, thus insuring continuous heating; and there must be a proper degree of humidity. There must also be freedom from explosions and danger from fire.

There are three methods of heating; radiation, conduction and convection. There are two systems by which these methods are used: they are local and central. In local systems the heat is produced in the room by combustion or burning of fuel in grates and stoves.

In central heating the heat is produced at a central place outside of the rooms and conveyed to them by hot air, hot water or steam.

Even though these three methods of heating are usually

given, it is difficult to draw hard and fast lines of demarcation between the different methods, for, as a matter of fact, they overlap to quite an extent. The element of radiation is involved in both conduction and convection.

LOCAL HEATING

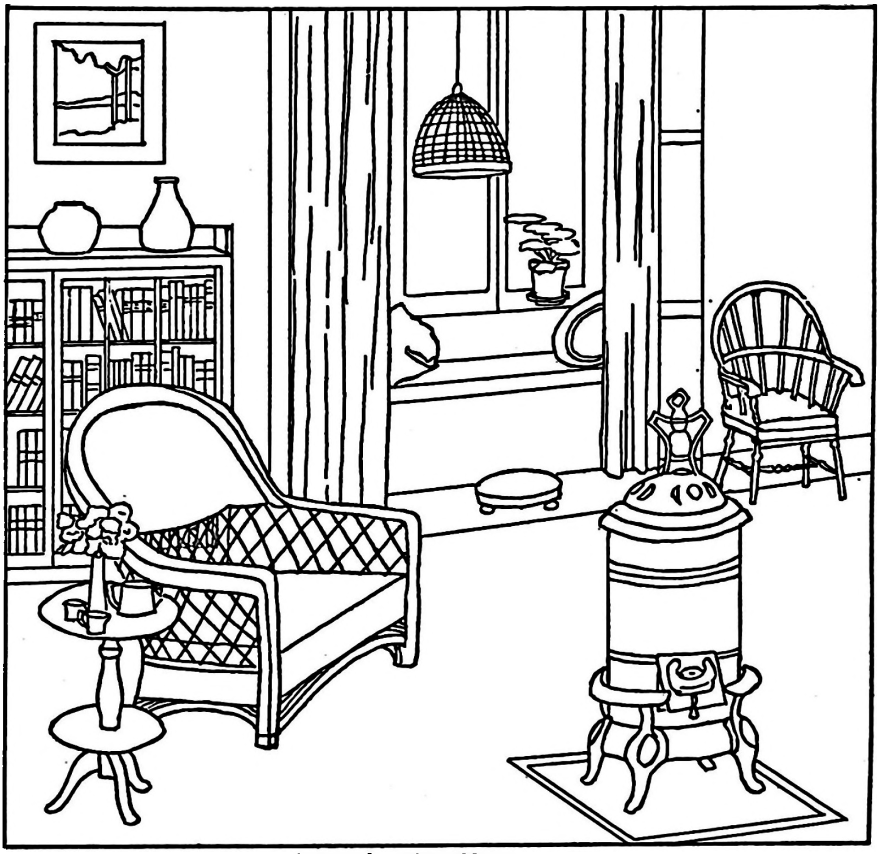
Radiation

The vibrating molecules of a heated substance will set into motion the ether of space and in this way the heat may be transmitted as wave motion. We have an illustration of this in the transmission of heat to the earth from the sun. Ether waves are generated by the violent vibration of the molecules of the sun and the vibrations are transmitted to the earth and they in turn generate molecular vibrations of the bodies of the earth. This is spoken of as radiant heat and is illustrated by the heat from the open fireplace.

Open fireplaces give off heat by direct radiation. This is the oldest method of heating and has been in use for many generations. It is not a satisfactory method, however. The radiation of heat takes place through air very readily, but air is not a good conductor of heat. Heat may be radiated from the body very rapidly through the air to cold objects. As for instance, sitting near a cold wall one will feel chilly due to the radiation of the heat from the body to the cold wall, although the air in the room may be sufficiently warm to be otherwise comfortable.

Heat may be readily radiated from an open fire, but it must be remembered that the intensity of the radiated heat is inversely proportional to the distance of the heated object from the place where the heat is produced. To illustrate: If one object is one foot from the source of heat, the open fireplace, and another object is three feet from the fireplace, the object that is farther away will receive only one-ninth as much heat as the one nearer. This is one of the disadvantages of the open fireplace as a means of heating a

room. A fireplace is very cheery and gives a room a comfortable appearance and is very popular in the modern home. It is adequate to take the chill away when the weather is not very cold, but it is certainly a very undesirable means of heating a house in cold weather.



Local Heating

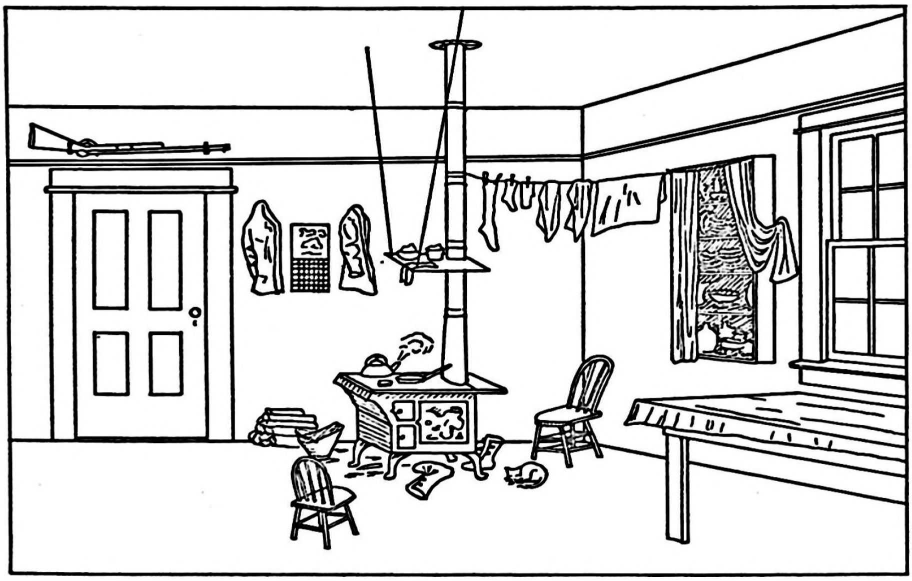
Another objection to the open fireplace is that it requires a great deal of fuel. About 75% of the heat is lost through the chimney. There is, however, an advantage in the open

fireplace since it affords an excellent means for ventilation; there is always a draft up the chimney.

Conduction

Heat is carried through such metals as iron by molecular action and such heat transference is known as conduction. The fact that heat is transferred through metals by conduction is of vital significance in the question of heat losses and dissipation, as through walls of buildings for example.

If heat be applied to any part of an iron bar or piece of metal it will be transferred to all parts of that iron by the



Undesirable Local Heating

molecular action until it is all heated. This can be illustrated nicely by placing the end of the poker in the furnace fire and in a short time the heat will be felt in the other end of the poker.

The **stove** is a good example of the conduction of heating.

The heat is conducted through the iron of the stove to the air in the room, and then by convection through the air to all parts of the room. The molecules that are in contact with the fire first have their motion accelerated by the heat and this motion is passed from molecule to molecule until all the molecules in the entire iron are accelerated in their motion and thus the temperature of the metal is increased. Some metals are better conductors of heat than others, owing to the difference in the character of the connection between the molecules. Silver forms the best conductor of heat among the metals and is used as a standard of conductivity.

In conduction heat is produced inside a fire pot, as in a stove, and conducted through the iron then radiated from its outer surface. This is also called indirect radiation and is a more satisfactory method than the direct radiation since the material of the stove will retain the heat for a longer period of time and allow for its more equitable distribution. In this way it is possible to heat the room more evenly than with an open fire.

One of the objections to this method is that it is local and has all the disadvantages of a local heating system. The combustion takes place in the room and as a result there are certain amounts of impurities that are admitted into the breathing zone. There is the added disadvantage of having dirt and dust from the fuel and from the ashes and refuse from the process of combustion. These disadvantages are not encountered in a central system.

In extremely cold weather the stoves are likely to become overheated in an effort to keep the rooms warm, and overheated stoves not only increase the hazard from fires, but tend to scorch the air. Red hot iron consumes oxygen and gives off carbon dioxide which produces an unfit atmosphere for breathing. It is difficult to maintain an even heat in a room that is heated by a stove for the stove requires a great amount of attention.

CENTRAL HEATING

Convection

The most desirable system of heating is the central. In this system the heat is conveyed from the central heating plant to the rooms either by air, hot water, or steam. The heat may be produced in the house that is to be heated, usually in the basement, or it may be produced at a distance, as in the case of steam plants, and carried through pipes to the house. There are three principal systems of central heating: Hot air, hot water, and steam.

Heat is carried through air by convection. The air exposed to heat becomes specifically lighter and hence rises and the cooler air takes its place. In this way the air of a room is heated by its constant movement brought about by this phenomenon. The air becomes heated in the air jacket of the hot air furnace and creates an upward draft. As soon as the cool air rushes downward to take its place a downward draft is formed through the cold air ducts. In this way the air in the room is kept in circulation and at the same time properly warmed.

Hot air, or as it is sometimes called, furnace heating, is a very satisfactory system for an ordinary dwelling or small building. It consists of a large stove much as that used in local heating. Surrounding this stove is a jacket with an air space between it and the stove. Pipes lead from the air space through the top of this jacket and convey the air that is heated by the stove to the different rooms. The cold air is taken from the rooms and conveyed through the cold air pipes back to the furnace and is admitted to the air jacket from beneath. In this way the warm air, being lighter than the cold air, passes upward through the hot air pipes and is replaced by the cold air through the cold air pipes. In this way there is a constant circulation of air through the pipes.

This kind of a furnace requires much attention, but not as

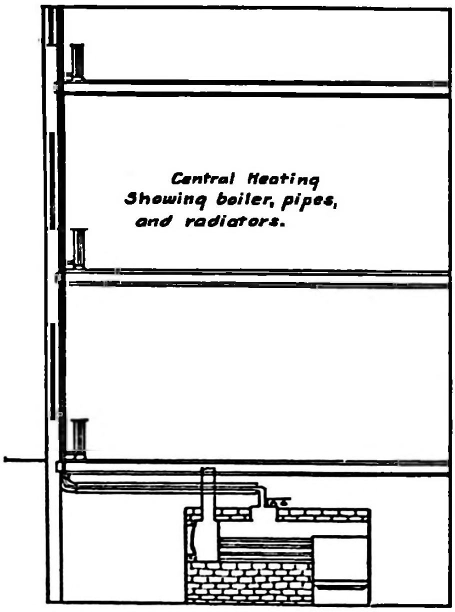
much as a local heating stove. Great care must be taken that the air is not overheated in the air jacket. If it is, the air in the room will be dry and stuffy and may even have a scorched odor. The furnace should be equipped with a water receptacle inside the air jacket. This receptacle should be kept full and in this way a proper relative humidity will be maintained. If this is not done, the air in the room will be too dry and it will require a higher temperature to keep the room comfortable. Another objection to this system is that dust and dirt are likely to enter the rooms from the furnace.

The hot water is a very desirable system of heating. Heat convection through water is practically the same as that through air. The particles of water at the point where the heat is applied become lighter as they become heated and because of this change naturally rise to the top and the particles that are cooler and therefore heavier sink to the bottom, thus forming currents. For this reason water heats much more rapidly when the heat is applied to the bottom than it does when heat is applied at the top of the receptacle. These principles are utilized in hot water systems. The hot water rises in the radiators and gives off its heat to the cooler atmosphere and the cool water returns to the boiler to be reheated. In this way there is a constant circulation of the water through the system.

The hot air system is entirely satisfactory for small buildings, but is not so desirable for large buildings. For large dwellings and public buildings the hot water system is much more satisfactory. In the hot water system a water jacket is provided instead of an air jacket. The water is carried from the boiler over the fire box through pipes to the different rooms where it passes through radiators and is returned to the boiler by continuous pipes. At the top of the pipes an expansion tank is placed to take care of the expansion of the water when heated. The heated water circulates freely through the system of pipes. Each radiator is provided with

a valve to regulate the amount of water admitted and in this way the degree of heat may be regulated in the different rooms. Each radiator is provided with an air valve to allow the air to escape when the water is admitted, or to allow the steam to escape in case the system becomes overheated and the water is converted into steam.

This system is easily cared for and easily operated. It requires a relatively small amount of coal and maintains a



very even heat, and when properly operated there will be no sudden changes in the temperature of the rooms. There is less danger of overheating the air and lowering the humidity with this system than with the hot air furnace.

The radiators may be placed in the rooms that are to be heated or they may be placed in the basement and the air admitted and passed over the radiator and warmed and then forced into the rooms. This is known as the indirect method

and is used in connection with the system of ventilation. It is used more with steam than with hot water.

Heating by steam is by far the most satisfactory method, especially for larger dwellings and buildings. This system is somewhat like that of hot water, except the water is converted into steam. The temperature of the pipes and radiators is therefore higher than with hot water, but the pipes and radiators do not need to be as large.

Very often this system is used in connection with the ventilation. The radiators are placed in the basement or in another convenient place and cool fresh air from the outside is passed over them and warmed. It is then forced into the rooms. Very often this air is washed, as described in the chapter on ventilation, and thus freed from suspended matter. At the same time the relative humidity can be controlled and this is very essential, not only as a means of providing air that is most desirable for breathing, but also in point of fuel economy, since air of high humidity is more easily heated and is more desirable in conserving the heat of the body as has already been explained. Steam heating is especially suitable for high and irregularly shaped buildings. The fact that the radiators and pipes are empty when not in use reduces the risk of damage to the house furnishings from bursted or leaky pipes.

It is well to have the radiators placed near windows so that in ventilating the air will pass over them and be warmed before entering the room.

CHAPTER VI
LIGHTING

LIGHTING

Adaptability of Eye to Light

- DIFFERENCE IN INTENSITY OF LIGHT
- TIME REQUIRED FOR ADAPTATION

The Eye

- MECHANISM OF EYE
- ACTION OF LIGHT UPON THE EYE
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Value of Sunlight

- EFFECT UPON HEALTH
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Natural Light in Buildings

- DIRECT RAYS OF THE SUN
- FACTORS DETERMINING THE AMOUNT OF LIGHT ADMITTED
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- WINDOW AREA REQUIRED

Artificial Lighting

- EFFECT UPON THE EYES
- EVOLUTION OF LIGHTING SYSTEMS
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CHAPTER VI

LIGHTING

Adaptability of Eye to Light

The eye has a great range of adaptability to the intensity of light. This is evidenced by the fact that the eye is readily adapted to the intensity of the bright sunlight or to the soft rays of the moon. In both instances there is no disturbance in vision, even though the intensity of illumination at midday when the light is brightest is almost a million times greater than the illumination from the full moon on a clear night. This adaptation takes place so perfectly and so independent of the educated mind that we give little thought to the great difference in intensity of light.

It must be remembered, however, that although this adaptation takes place so perfectly and without any apparent difficulty, it requires an expenditure of Innate force to accomplish this action. If the change takes place too rapidly from a soft light to an intense light, without sufficient time for adaptative action to take place, the delicate structure of the eye will be damaged by the violent light vibrations. The change from the soft rays of the moonlight to the intense illumination from the bright sun takes place gradually. First, the night; next, the gray dawn of morning; and then comes the sun, whose rays are softened as they pass through a maximum amount of atmosphere near the horizon, and as the sun approaches the dome of the arc, the rays become more intense, since they pass through less of the earth's atmosphere. Then the process is reversed as the intense light from the sun gives way to the softer rays from the moon.

This gives Innate plenty of time to bring about the adaptative processes so necessary to adjust the eye to these extremes,

time being a very important factor in all the processes of the body.

Thus it is appreciated that the subject of lighting is important from a hygienic standpoint, since improper lighting necessitates an unnecessary expenditure of energy and causes impaired health.

The Eye

That we may better appreciate this adaptability and have a clearer understanding of the mechanism through which Innate Intelligence accomplishes this adaptative action we will review briefly the organ through which we perceive light—the human eye.

The eye consists of a crystalline lens, powerfully refractive, held between two transparent liquids called the aqueous humor, which is in front of the crystalline lens and the vitreous humor, which is behind or posterior to the crystalline lens. The aqueous chamber is divided into an anterior and posterior chamber by the diaphragm called the iris, through which is an opening called the pupil, permitting communication between the chambers of the aqueous humor. The retina, which is composed of nervous tissue, lines the posterior five-sixths of the inner surface of the posterior wall of the eyeball. At the back of the retina and in the direct visual axis is a spot known as the macula lutea, a yellow spot, in the center of which is a depression known as the fovea centralis. At this point the vision is clearest and it is this spot used when we turn our eyes and look directly at an object.

With such a delicate instrument as the eye it is only reasonable that special care and arrangement should be supplied to protect it from sudden changes in the intensity of light. Otherwise the eye would be greatly injured by the glare of light. This adaptation is accomplished by means of regulating the amount of light admitted to the retina. This is done

through the expression of Innate by regulating the size of the pupil.

When the eye is exposed to light, vibrations are carried to the brain through the afferent nerve fibers and Innate Intelligence becomes aware of the light. If it is intense and is allowed to remain in contact with the retina the delicate nerve tissue will be injured. To compensate for this Innate Intelligence sends motor impulses to the circular fibers in the iris, causing them to contract and decrease the size of the pupil and thus shut out a part of the light rays. In a less intense light or in the darkness the muscular fibers are relaxed, enlarging the pupil and admitting more light. In all of this adaptative action there must be sufficient time, although the action does take place almost instantly. This action is not automatic as some would have us believe, but is intelligent and under the direct control of Innate Intelligence.

If we were living in the natural state of man's existence there would be no need for a consideration of these natural laws governing the working of the human body and the intelligence which controls these manifestations; but as man has increased his knowledge and has made for himself a more or less artificial environment, it becomes necessary for him to understand the natural laws that he may adapt his artificial environment to them. If man lived in the open outdoors there would be no need for the artificial lighting of buildings; but since he has created buildings it becomes necessary for him to study the laws of nature that he may produce a condition in this environment conducive to the expression of life. In providing artificial light for our buildings the laws of the physical organ of sight must be considered. However, the question of lighting is not alone one of artificial production of light in our buildings, but also deals with proper admission of natural light from natural sources.

Value of Sunlight

The value of the sunlight in respect to health has been recognized from time immemorial. Direct rays of the sun are essential in the development and expression of animal and plant life. The sun's rays are Nature's greatest germicide. They destroy almost all forms of germ life. Most of the chemical reactions are hastened or induced by the action of light. Light prevents or retards the development of the lower forms of life but promotes the growth of the higher forms.

Natural Light in Buildings

From the foregoing statement it is quite obvious that a proper amount of light, and if possible the direct rays of the sun, must be admitted to the home if it is to afford an environment at all conducive to the expression of life. It is therefore necessary to make special provision for the admission of light. The amount of light admitted to a building will be determined by its location and aspect, the source of the light, whether direct or reflected, the location and size of the openings, and the kind of glass used. The character of the walls and other inside surfaces will determine the light diffusion.

Since direct rays of the sun give more light than those reflected, it is desirable to admit them to the house as much as possible rather than to depend upon reflected light from the surfaces outside, such as the trees and buildings.

There is a certain loss of light as it passes through window glass. This loss is about 8% through plate glass while through double glass the loss is 10%, and through milk glass there is a loss of 50%. The amount of light in a room may be increased by the use of prism or ribbed glass which results in a more even distribution of light over the room.

The window area of rooms in a home should be not less than 10% of the floor area, or not less than one square foot of glass surface for every seventy cubic feet of interior to

be lighted. This is not sufficient, however, for a schoolroom or for factories. The schoolroom should have a window area not less than one-fourth of the floor space.

Windows should be placed so as to admit direct rays of the sun and should extend within six inches of the ceiling. Window shades may be used to regulate the amount of light admitted, but care should be exercised in keeping down the dust, since it accumulates on the shades and is disturbed when they are adjusted. The dust then gets into the breathing zone and becomes objectionable from a hygienic standpoint.

Artificial Lighting

With the present day modern methods of artificial lighting it seems there would be little difficulty in lighting our homes and other buildings; but the question is not alone one of how they are to be lighted, but also how this can best be accomplished and not interfere with health and produce eye strain and other conditions that are likely to follow improper lighting.

It is interesting to note the evolution of the lighting systems from the primitive man who carried a burning stick from the campfire into his cave and thus realized the pleasure of the privacy of his own dwelling, up to the modern lighting systems. For centuries man burned wood and other materials in their natural state and depended upon these for his illumination. Then it was discovered that by dipping this raw material in animal fat more light could be obtained. Later the oil was placed in a container and a wick used. Then from this crude grease lamp with its wick evolved the candle, which was a great improvement over the former method. And so mankind groped in comparative darkness through centuries. It was not until the closing years of the nineteenth century that he found a better means of illumination. In 1879 Edison brought out his wonderful invention, the electric

light. Even the evolution of this light would be interesting for there have been many improvements over the original.

It is very obvious that the best method of lighting is by the use of the incandescent electric light. It produces the desired intensity, does not vitiate the air, requires little attention, and is operated at a minimum expense.

The objections to the open blaze for illumination are that oxygen is consumed from the air, carbon dioxide and other impurities are given off, the light is not constant, since there is a tendency to flicker and especially so in a draft, it requires more attention, is unhandy to operate and does not give the proper amount of illumination. Most of these objections are overcome in the electric light.

The source of light must be so placed that it will not strike the eyes directly. Care must be taken that there are no surfaces reflecting light directly into the eyes. The lighting system must provide illumination of sufficient intensity, yet without a glare which produces eye strain. While our modern methods of artificially producing light are a great boon to civilization, they may also be a great detriment to health to say nothing of the discomfort that is caused by improper methods of lighting our homes, schools, and workshops.

Psychological Effect of Light

It is not out of order at this time to mention the effect of light upon emotions of the human family. Proper illumination is commensurate with the particular functions carried on within the place illuminated. Note the soft light effects of the cathedral and the influence it has on the people who visit the place. Enter a church building with its "dim religious light" and note the calming effect which it has on the assembly of worshippers. To be sure they have gathered in the place for worship and are in that state of mind which would be expected of those in a revered mood, yet there is no question

as to the influence of the surroundings and especially of the lighting. It would be quite out of keeping to have the cathedral as brilliantly lighted as the "Great White Way." The architecture, the furnishings and the lighting all have a certain influence upon the minds of the individuals.

As the dim, soft light has a quieting influence so the bright, dazzling light has a stimulating effect. This is observed in the lighting of amusement places where the predominating feature of the entertainment is hilarity. The pulse may be made to beat faster, the thoughts turned from the serious things of life to the less serious, and the mind made to desire the activities of the pleasurable things of worldly enjoyment by the peculiar environment and the intensity of the illumination. Or the mind may be soothed into the tranquil moods and the entire being made to surge with emotion, while the mind is directed from the more frivolous subjects to the deepest thoughts of the philosopher with a proper arranging of the surroundings and a soothing and delicate lighting over all. While these things do not bear directly upon the subject of hygiene in the more commonly accepted way, yet they do have a certain bearing upon health and the physiological functions of the body, especially from the standpoint of environmental influence upon the body and its adaptation through the action of Innate Intelligence.

Systems of Lighting

Direct lighting is secured by fixtures which throw the light downward into the room from which the eyes are protected by properly adjusted shades. Indirect lighting is from bowl-like fixtures in which electric lights are placed and the light rays are reflected upward toward the ceiling with no light penetrating the bowl. Semi-indirect is accomplished by using a bowl which will permit some of the light days to penetrate.

The best results are obtained by a combination of the direct and indirect methods of lighting and in some cases by

a semi-indirect way. It has been observed that the direct rays of light should not fall squarely into the eyes. It is also quite essential that in some cases there should be direct rays on the work or object under observation. To accomplish this and at the same time to keep the light out of the eyes there must be a judicial use of shades and other means of softening the light.

There are some objections to the indirect method in that all the light is thrown on the ceiling. This gives a very soft light in the room, but is not sufficiently bright and faces lose their expression; there is insufficient modeling of objects, and the interior will be almost devoid of character. This form of lighting, therefore, is undesirable for home and offices, but is not objectionable for places of amusement.

There are also objections to the direct system since the strong direct light makes too harsh shadows and a light glare which is very objectionable. By properly diffusing this direct light and adding sufficient upward light we get a much more effective and pleasing illumination.

By using the two systems, or better still, by combining the two systems into the semi-indirect, a method is obtained which will furnish an abundance of light and at the same time give one that is so perfectly diffused there will be no objectionable shadows and no harmful glare.

Insufficient light may be quite as injurious to the eyes as too much light. As a matter of fact it is not so much a question of too great an intensity as it is of the proper light direction; it is hardly possible to get a light of greater intensity than that of the sun, but we are very careful that the sun's direct rays do not enter the unprotected eye; neither is it good to permit the reflection of the rays into the eyes, as from a printed page.

(For schoolroom lighting see chapter on School Hygiene.)

CHAPTER VII
WATER

WATER

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CHAPTER VII

WATER

GENERAL CONSIDERATIONS

Necessity for Proper Supply

One of the most important requisites in maintaining the organization of the material in the living body is a proper supply of water. It is absolutely indispensable to the expression of animal and vegetable life. Although not classed as a food it enters into the composition of food and hence becomes an essential article of diet.

The greatest value has always been placed upon a sufficient supply of pure water. The history of the race shows that the earliest settlements were made with a view to obtaining a supply of water; they were either on waterways or in places where water was easily obtainable from springs or shallow wells.

Water is needed not only as an article of diet, but it is also required for sanitary purposes: for cleansing the body externally, for washing clothes, and also for sprinkling streets and for other purposes such as sewage disposal in the thickly populated centers. Even in ancient times great sums of money were expended for the public supply of water.

History of Public Water Supply

A bit of history on this subject might be of interest to some. It is asserted by historians that there are aqueducts in China dating back to prehistoric times. Channels cut in solid rock have been revealed in Jerusalem in recent excavation which indicate that they were used for conveying the water supply from the country near Bethlehem and Hebron. There have been found in these excavations channels of

earthen pipes cemented together and covered with rough rocks. The fact is also quite well established that water was brought to Athens from Mount Hymettos and Mount Pentelikon.

As early as 312 B. C. water was carried to Rome through an aqueduct ten miles long. It is estimated that the cost of construction of this aqueduct was about $12,700,000. Another was begun in 272 B. C., the length of which was forty-five miles. The water carried by this aqueduct was not used for drinking but for irrigating purposes and for flushing drains.

Altogether there were at least nine aqueducts that supplied the ancient city of Rome. Of these nine, three are still used to supply modern Rome. One of these was finished by Agrippa in 27 B. C.

We see by the foregoing that from time immemorial there has been a great expenditure of energy and money in producing a proper water supply for the human family. It also reveals the fact that the ancients knew something about engineering projects which some of us are likely to consider as modern accomplishments.

Composition of Water

Water is not, as was previously supposed, an elementary substance. In 1781 it was shown by Cavendish that it consisted of two parts of hydrogen and one part of oxygen (H_2O), and that it could be made synthetically by combining hydrogen and oxygen in this proportion, and that it could be separated analytically by various methods into its component parts.

By volume, water is composed of two parts of hydrogen to one part of oxygen; by weight, one part of hydrogen to eight parts of oxygen. However, pure water does not exist in Nature since water is a universal solvent and in Nature it comes in contact with so many substances; therefore, it

contains many substances in solution. Chemically pure water is found only in the chemist's flask.

Water is a liquid which is clear, colorless and odorless. To be palatable it should be cool, soft, well aerated and free from sediment and suspended impurities. One cannot judge the purity of water by any one of these qualities, for water that is palatable and gives no offense upon drinking might be polluted with that which would be detrimental to health. The palatability of water may be due to the carbonic acid present, which results from the decomposition of products contained in it.

The carbon dioxide, which is present in rain water, is obtained from the air through which the rain passes. Carbon dioxide is also taken up by the water as it percolates through ground covered with vegetation. The presence of this gas increases the solvent powers of the water. Water may also contain metal in solution such as iron, arsenic and copper.

The important foreign ingredients in water are those of organic origin, such as microscopic plants, vegetable fungi, detritis of vegetable life, minute insects, infusoria, ova of insects, minute parasites, and animal debris. Water usually contains millions of various micro-organisms, mostly harmless, although at times it may also contain so-called pathogenic germs.

States of Aggregation

Water is formed into the solid state, ice, at zero degrees centigrade. At 100° C. water boils and is converted into gas or vapor, although water is contained in the air in the gaseous form at ordinary temperatures. Between these two limits, 0° C. and 100° C. water obtains in the liquid form which is its most common state. Water is the most widely distributed of all the substances. It is practically incompressible. When heated it contracts until it reaches 4° C., or 39.2° F., and is

at this point taken as the basis for specific gravity of liquids and solids.

Universal Solvent

Water is the most universal solvent known in Nature. Practically all substances yield to it. Most of the water taken into the body passes through unchanged, although it is only reasonable to suppose that some of it is broken up into its elements and united with other compounds of the body.

Necessity for Water in Body

Water composes about 70% of the entire weight of the body (about 58.5% per volume). A very great amount of water is required by the tissue for the performance of the bodily functions. As the gears of machinery must be bathed in oil to prevent undue wear, so must the tissue cells be bathed in water (secretions) that there be no undue wear. The tissue cells are spoken of as being aquatic in their habits.

Rosenau in summarizing the use of water in the body says: "It enters into the chemical composition of the tissues; it forms the chief ingredient of all the fluids of the body and maintains their proper degree of dilution, and thus favors metabolism; by moistening various surfaces of the body, such as mucous and serous membranes, it prevents friction; it furnishes in the blood and lymph a fluid medium by which food may be taken to remote parts of the body and the waste material removed, thus promoting rapid tissue changes; it serves as a distributor of bodily heat; it regulates the body temperature by the physical process of absorption and evaporation."

Chemically Pure Water

Chemically pure water can be obtained only by distillation; it is undesirable, however, for drinking purposes because of its insipidity. Before such water is agreeable for drinking

it must be aerated; this may be accomplished by agitation or by passing it through a porous substance containing air. One of Nature's methods of aerating water is found in mountain streams where the water flows down over rocks. The same thing is accomplished by fountains and waterfalls. It is the mineral matter and the gases held in solution that give water its taste, and it is the difference in these minerals and gases that causes the individual to dislike the taste of water which he is not accustomed to drinking. But this is purely a matter of taste and has no value from a hygienic standpoint, for the most impure water, water that contains so-called pathogenic germs, may taste very good.

Turbid or muddy water is not necessarily impure from a hygienic standpoint when found in rivers, but when subsoil water becomes turbid it should be regarded with suspicion.

Hard and Soft Water

The question of hard and soft water is one that must of necessity receive some consideration, but it is of more importance from an economic standpoint than from a sanitary standpoint. Soft water is generally considered to be more desirable for drinking purposes, and it is certainly more desirable for cooking. From an economical standpoint, soft water is more preferable as the hard water requires more soap to produce a lather.

Hardness of water is spoken of as being temporary or permanent. If the water remains hard after having been boiled it is known as permanently hard water. Hardness of water is due to the presence of the soluble salts of the alkaline earth metals, especially calcium and magnesium. Temporary hardness is due to calcium or magnesium carbonate held in solution as a bicarbonate by the dissolved carbon dioxide. The hardness is temporary because the carbon dioxide is driven off by boiling, and the soluble bicarbonates are precipitated as insoluble carbonates.

Permanent hardness, on the other hand, is due mainly to sulphates and chlorides of calcium or magnesium. These salts are stable and therefore are not precipitated by boiling.

Elimination of Water from Body

Water is excreted from the body through the various channels. The kidneys excrete about 50%, the lungs about 20%, the skin about 28%, while the other 2% is excreted through the feces and other minor channels.

Amount of Water Needed for All Purposes

The amount of water needed for all purposes varies just the same as the amount of water needed by the body varies with conditioning factors. The locality and the climate will enter into the consideration of the amount of water needed to meet the requirements of hygiene and sanitation.

The amount of water required by the human body in twenty-four hours varies with many factors. The age of the individual and his occupation and health, and climate would be conditioning factors. However, authorities are pretty well agreed as to the amount necessary. It is estimated that the body requires a little less than one gallon of water per day, about two quarts taken as drinking water and the balance in food.

There is a wide range of difference in the amounts estimated, for under some conditions, a minimum of seventeen gallons, or even twelve gallons, would be sufficient, while under other circumstances and in other localities as much as 300 gallons per day per individual would not be an excessive or wasteful amount. The average amount estimated per individual per day for domestic purposes is placed at seventeen gallons for all purposes. In 1918 the statistics showed that Buffalo used an average of 260 gallons per capita per day, but many cities used much less. In Berlin in 1913 the water

consumption amounted to an average of twenty-four gallons per capita per day.

The hygienic importance of these figures is insignificant since they are only approximate. There are a number of factors that are not taken into consideration. The figures are estimated on the number of gallons of water pumped and no account whatsoever is taken of the water waste through precipitation and loss through leaky pipes. Some engineers maintain that fully half the water pumped is lost in these various ways. Another thing that must be considered when comparing the amount of water used by different cities is the industries. Some industries require much more water than others, therefore, if a just comparison is to be made between cities only the water that is actually passed through the private meters must be considered.

Water Waste

Consideration of the subject of water would not be complete without some reference to the amount of water that is wasted. It seems a small matter to waste water. We sometimes say there is plenty in the river. But the proposition of preparing the water for use and getting it to the individual for consumption may involve many phases of hygiene from several different angles and one of these angles may be industrial hygiene. To get water into the home and factory requires a great many processes such as laying and maintaining water mains, purifying the water and pumping. This involves several industries and trades, so the problem of a water supply is far reaching and is of vital importance to the community.

There should never be a sacrifice on the part of hygiene and cleanliness for the purpose of saving water. A sufficient amount of water should at all times be insisted upon, but certainly there should be a strenuous effort to eliminate undue waste.

The main causes of water waste will be found to be leakage in mains and service pipes and waste from defective fixtures in the house. All of this leakage and waste should be properly attended to because of the direct relation which it bears to hygiene and particularly to industrial hygiene.

The introduction of meters has been an important factor in reducing water waste. It is not the thought to limit the amount of water used or to deprive one of a sufficient amount, but there is nothing to be gained by an unnecessary waste. The introduction of meters in Milwaukee reduced the amount of water used per tap from 1,781 gallons per day to 644 gallons per day without putting any restrictions upon the consumers. It is an enormous task to provide a sufficient amount of pure clean water for a large city and certainly an effort should be made to avoid waste.

SOURCES OF WATER SUPPLY

Rain Water

The sources of our water supply may be classified as: Rain and snow water, surface water and ground or subsoil water.

The rain and snow water provide a supply for domestic purposes. This source cannot be relied upon in some sections of the country because of the variable amount of rain fall. Rain water is pure from the fact that it has been vaporized and then condensed the same as in distillation; but it does not remain long in this pure state since it is exposed to so many sources of pollution. This water is collected in receptacles called cisterns and tanks and used mostly for household purposes. It can readily be seen that water thus stored might become polluted from the surfaces with which it comes in contact. To prevent this special care would be necessary, and in the majority of cases the need for this precaution is not recognized.

This source of water supply is not very desirable since its

quantity is variable and also because of the difficulty in storing large quantities and in providing protection so that it will not become contaminated and thereby rendered unfit for household use.

While rain water in its unpolluted state is a pure water, it is not suitable for drinking purposes until it is properly aerated. The air contains dust and other suspended impurities which will be precipitated with the rain and thus pollute the water. However, the amount of pollution is so small that it is of little sanitary importance. After the air has been cleared of these suspended impurities the rain water will be relatively pure. It will be noticed that after a rain the air seems clear and clean; this is due to the rain actually washing the air.

It is necessary to filter rain water collected from the surface of roofs because roofs collect impurities from smoke and dust. The average filter used for this purpose is usually inadequate and receives such little care that it is of slight value.

In the large cities or even in the larger towns the cisterns have been replaced with more modern and more satisfactory means of water supply. Rain water is soft and therefore is most desirable for laundry purposes and is also very desirable for cooking. It is not considered as satisfactory for drinking, however, as ground water or properly filtered surface water. It always contains gases such as nitrogen, oxygen, and carbon dioxide. The amount of solids varies. The storage of water in cisterns forms a good breeding place for a certain kind of mosquito, stegomyia calopus, which is supposed to cause yellow fever; but regardless of the supposed pathogenicity of this mosquito it is quite objectionable.

Surface Water

Surface water is derived from ponds, lakes, rivers and creeks; in fact, any water which is in contact with the atmos-

phere is known as surface water. Surface water forms really the most desirable and satisfactory source of public water supply.

Streams form natural sewers for the regions which they drain and ponds and lakes form convenient dumping places for the sewage carried by the streams, therefore it will readily be seen that the surface water is liable to great pollution from these sources. It therefore becomes necessary to purify it by some means before it can be used for domestic purposes.

At one time it was thought that streams purified themselves in their flow, but this is now disputed and has been proven to be erroneous and should be strenuously denied. There are many factors at work in Nature which purify water in its natural state. Before civilization brought about so many artificial and unnatural conditions it was true that, with the small amount of waste material emptied into the streams, Nature would, through her natural processes, keep the waters of the streams in a state of natural purity. But in the present day with not only the sewage of our large cities pouring into the rivers and lake, but also the waste material from factories and different industries, it becomes necessary to use some artificial methods for water purification.

Lakes, from a sanitary standpoint, form a more desirable source of public water supply than rivers. There are several reasons for this. First: there is possible a greater dilution of the impurities that reach the lake. Second: there is greater opportunity for sedimentation which is a very important process in water purification. Third: the water is softer than river water and freer from organic impurities.

The greatest problem that a city getting its water supply from a lake has to solve is how to keep its sewage from polluting its own water supply. To prevent this, it is necessary to place the intake for the water supply far out in the lake. The danger from pollution has become so great in some places, as in Chicago, that special canals have been constructed to

carry the sewage into other channels rather than empty it into the lake.

The impurities from the sewage may travel a great distance into the lakes. Serious sewage pollution was found ten miles out in the lake from the mouth of the Detroit River. Pollution has been found as far as eighteen miles from the shore in some places.

So it is readily observed that, notwithstanding the fact that the lakes and ponds furnish a more desirable public water supply, yet this source is not, by any means, free from objections.

The impounding reservoir, which is an artificial reservoir for the purpose of storing up water, is another very reliable source of public water supply. These reservoirs are often built in the mountains by placing a dam across a ravine or canyon. The largest dam in the world is the New Croton across the Esopus Creek in the Catskill mountains in New York. It is 248 feet high, 185 feet thick at the bottom and eleven feet thick at the top. This impounding reservoir furnishes an addition to the water supply of New York City.

There are many advantages to the impounding reservoirs, but there are also many disadvantages. One advantage is that the area drained is comparatively small and therefore the pollution from that source is lessened; also the storage factor which is experienced in this reservoir is an advantage. In this way many of the so-called pathogenic microörganisms die before they are carried to the consumer. A disadvantage is that they are open to the atmosphere and light and this is conducive to stagnation because the water is still. This results in an increase in the growth of algæ and other microscopic organisms. The stagnation of the water results in an increase of the products of decomposition. This, together with the microörganisms and algæ, produce the foul smell and bad taste of the water.

The stagnation of impounding reservoirs and small lakes may become a vital factor from a hygienic standpoint. If the water is less than twenty feet deep it will be kept in motion by the wind and in this way will not become stagnant, but if it is more than twenty feet deep the lower portion will remain still. This prevents the water from mixing and therefore the under portion will become stagnant while the surface will not. If the water supply is taken near the surface there will not be so much danger from the stagnant water, but even then there are times of the year when there is a complete stirring up of the water. This mixing of the surface water and the bottom water takes place twice a year, in the spring and in the fall. This mixing is the result of the changing of the temperature of the surface water. During the summer the surface water becomes warm and the temperature may reach 80° F. In this way the warm water remains on top but is kept stirred up by the wind. The wind will not usually create a disturbance for more than twenty feet except in very large lakes where it may be as great as forty feet.

As winter approaches the water cools until finally the temperature of the surface water becomes the same or more nearly the same as the bottom water. Then the wind exerts a deeper influence and the surface and deep water will mix. During this process vertical currents may be produced. This mixing continues until all the water has been thoroughly mixed and until the temperature of the surface water goes below the point of maximum density which occurs at 4° C. The cold water accumulates on the surface where ice is often formed. In the spring the process is just reversed. The fall mixing of the water is much more thorough and intense than the spring mixing.

The changes brought by this mixing are obvious. The surface water contains a large amount of oxygen. The bottom water contains much less oxygen but a great quantity of decomposed products. The oxygen is carried to the bottom

and there oxidizes and neutralizes some of the products of decomposition.

The sources of impurities in surface water are various. One of the most menacing sources is from the sewage which is carried from the centers of population. In the rivers it is the sewage of the towns and cities situated above. In the lakes it is usually the sewage of the city itself that is likely to pollute its own water supply. Under the present conditions it seems that it is easier to purify the water supply than to purify the sewage or provide some other method for its disposal.

Naturally the water of rivers is purest near the source. The reason for this is that the rivers form a natural drainage for the land through which they flow. The waste products from every process carried on in that territory find their way into the streams as a natural result of the law of gravity. The water will be found to contain large amounts of mineral and organic matter after passing through populated and cultivated areas. Purification of rivers is considered under Water Purification.

Ground or Subsoil Water

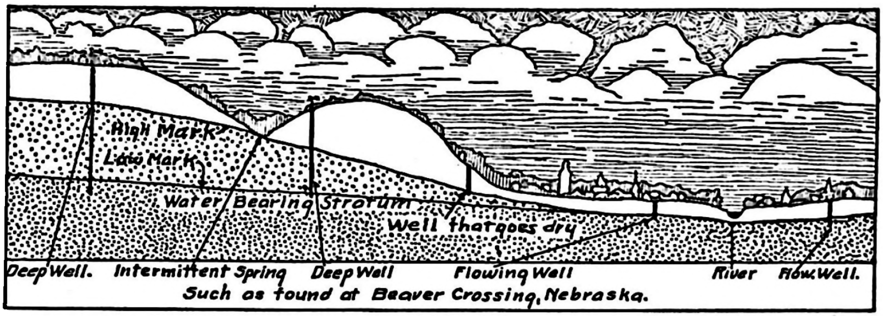
In the consideration of the three sources of water supply it is difficult to draw definite lines of demarcation since the rain and snow water soon becomes surface water and the surface water may percolate through the ground and become subsoil water.

Well water and spring water are classed as ground or subsoil water. From a hygienic standpoint water obtained from wells or springs forms a very reliable and satisfactory source of supply.

Especially is well or spring water desirable for private domestic use, since it is usually in a reasonable degree of purity and does not, therefore, require any artificial process for purification. The sources of water supply used for public

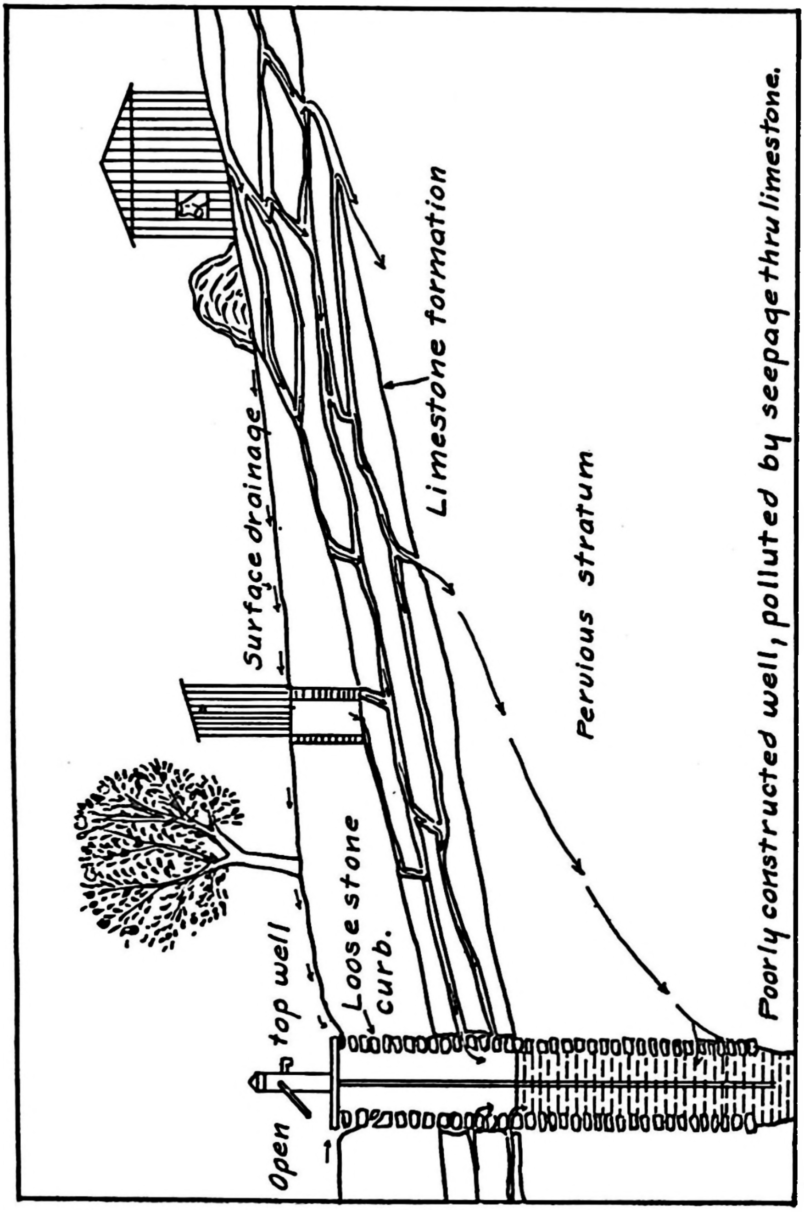
purposes, made necessary because of the volume of water required, are not so satisfactory for a private or domestic supply because its purification would entail too great an expense to warrant the practicability on such a small scale. Therefore, the most desirable source when only a limited amount of water is required is the wells.

Wells may be used for public water supply and are in some of the smaller towns, but they are not so practicable as their supply is likely to be inconstant. In other words, there is danger of the wells going dry, and since they are put down at a great expense, this would be too great a risk to take even though the water thus obtained is satisfactory from a hygienic standpoint.



The above illustration shows the fluctuation of ground water. When the ground water is at the low mark the shallow well becomes dry; as the water rises it flows into the well. When the water has reached the high mark the intermittent spring becomes a flowing spring. The pressure of the ground water is great enough to produce flowing wells down on the level.

Not all wells, by any means, will furnish a pure water supply. There are many factors to consider from the viewpoint of the pollution of well water and these will be considered in due time. When water reaches an impervious strata it remains at that level and moves in a horizontal plane. Water may form in beds or be found in underground streams. It is only in the limestone regions that water forms in streams under the ground.


Open top well
Loose stone curb.
Surface drainage
Limestone formation
Pervious stratum
Poorly constructed well, polluted by seepage thru limestone.

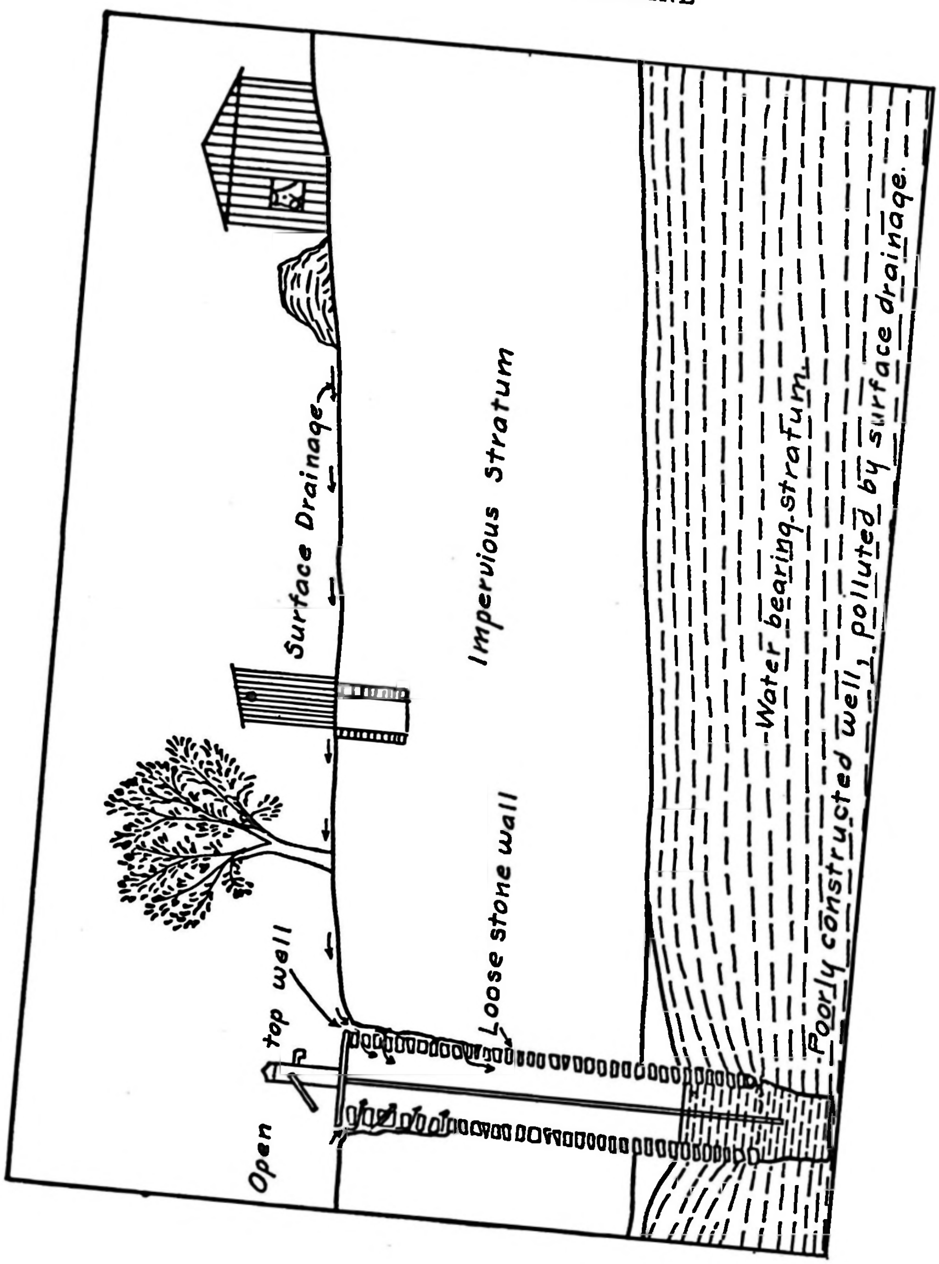
The depth at which water is found beneath the surface varies. The water directly beneath the surface, or that which is derived from surface drainage and the rainfall, is, by some, styled the ground water. This is the shallow water. That which is found at a lower level is called the lower subsoil water or underground water.

The ground water does not provide a very desirable source of well water because there is danger of pollution from the surface. The degree of this impurity will depend largely upon the character of the soil. If it is sandy and thus provides a good filter medium there is little danger from pollution; but if the soil is of a limestone formation it makes a very poor filter and the shallow water is likely to be polluted from the surface drainage.

The subsoil water moves in the direction of the nearest body of water. That is, if it is near a river or lake its movement will be in the direction of this river or lake. For this reason a well near the seashore will contain fresh water.

In wells less than fifty feet deep the temperature of the water will be influenced by that of the atmosphere. It will be warmer in summer and cooler in winter. Some authors put this depth at much less than fifty feet, maintaining that the atmospheric temperature will have no influence whatsoever at such a depth. It is true, however, and the fact is undisputed, that in wells 50 feet deep or more the water is cool and the temperature remains constant. It is not influenced by the change in atmospheric temperature.

Sand and gravel deposits form the best source through which to obtain subsoil water. To supply any very great amount there must be a number of wells and these must be far enough apart so as not to draw from the same territory. Seventy-eight million gallons of subsoil water per day is provided at Brooklyn from twenty-four separate pumping stations. Memphis, Tennessee, is the largest city in the United States


Open top well
Loose stone wall
Surface Drainage
Impervious Stratum
Water bearing stratum
Poorly constructed well, polluted by surface drainage.

which gets its entire water supply from sand and gravel deposits.

Sandstone rock furnishes an excellent source for subsoil water since it makes an excellent filter. Because of the limited amount of water obtained in a sandstone formation this source is practicable only for a very limited supply.

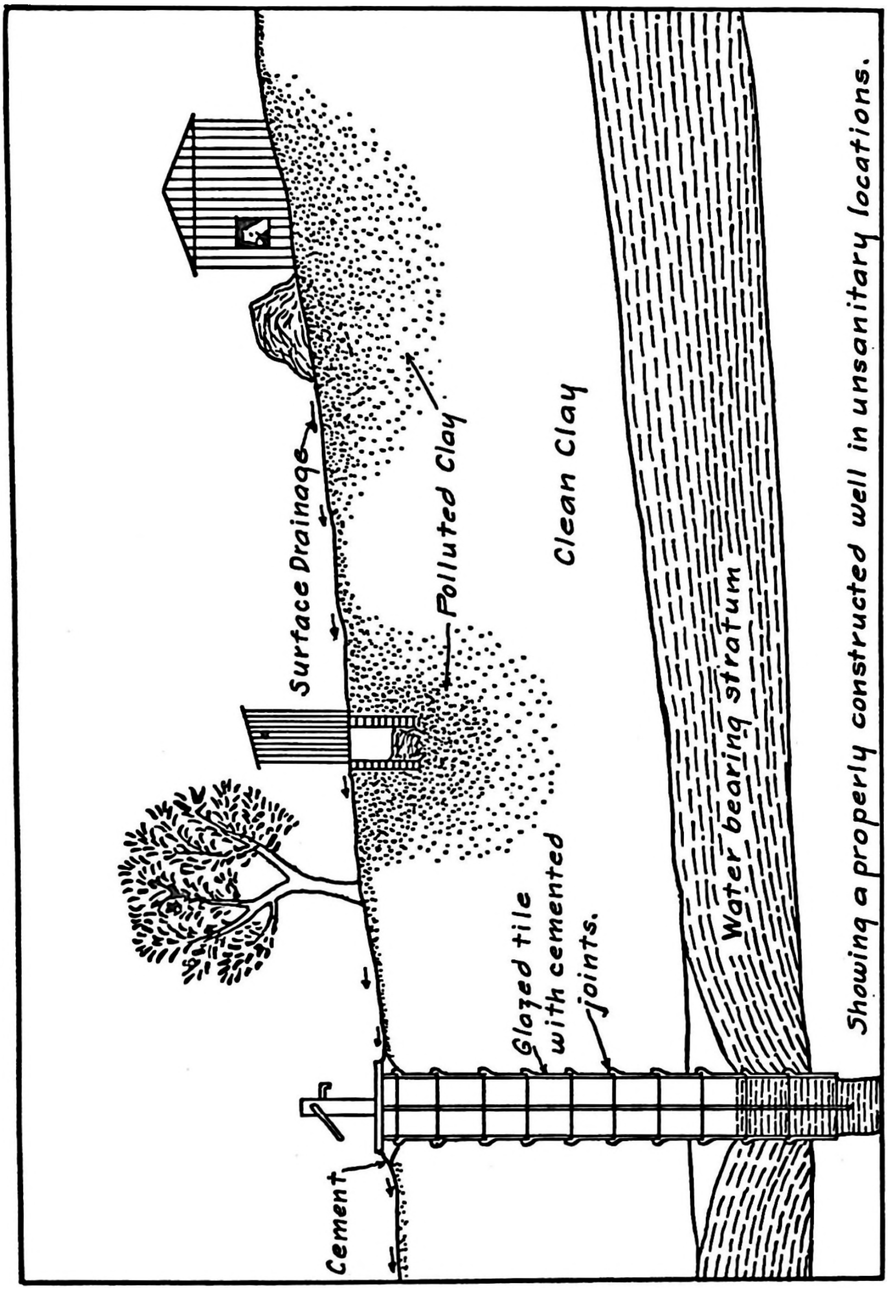
Limestone formation is the most undesirable source of subsoil water supply from a hygienic standpoint. Limestone is not porous and therefore has no filtering qualities. If water does pass through this sort of a formation it must travel through its crevices and fissures.

It is very difficult to know where the pollution of water passing through limestone originates. As these fissures are usually very long, and as the water is in no way filtered as it passes through them, the contamination might enter the water at a point far distant from where the well is sunk. The water supply from limestone is likely to be inconstant because the water is not contained in the limestone, but flows through the cracks and crevices. In this way it may soon flow away unless the source is replenished by rain or snow.

Water from the subsoil is obtained, as has been stated, from wells. Wells are classified as shallow and deep. By a shallow well is commonly meant one that is dug and not more than thirty feet deep. This type is usually walled up with brick or stone and is from five to six feet in diameter. Shallow wells may also be driven. That is, a gaspipe with a sand point is driven into the ground until the water-table is reached, the water being pumped out with an ordinary suction pump.

Shallow wells must never be considered a satisfactory source of water supply where there are conditions existing which would result in such pollution of the ground that the water percolating through can not be more or less filtered. Sewage polluted soil never is satisfactory for shallow wells.

Deep wells are drilled and are from six to eight inches in



Showing a properly constructed well in unsanitary locations.

diameter. The water from deep wells may be free from contamination but may contain a great deal of mineral in solution and different salts which render it permanently or temporarily hard. This decreases its value from a sanitary viewpoint and more particularly from an economic standpoint.

Special attention should be given the construction of the well. The casing or walls should be as tight as possible. Special care should be exercised against the possibility of surface water percolating through the casing as this drainage will bring impurities.

The casing should project far enough above the surface of the ground to insure against water running from the surface. It should extend at least eighteen inches above the ground. The well should have a tight covering.

The ground possesses great filtering qualities and therefore great quantities of impurities will be taken from the water as it filters through. The danger is when the ground becomes so filled with impurities that its filtering qualities have been destroyed or when there is not sufficient distance between the source of pollution and the water level; also when the soil is of a limestone formation and the water, instead of percolating through it, passes through cracks and crevices, in which event it will in no sense be filtered.

It was at one time considered that wells should be ventilated and a great deal of stress was laid upon it. When it is taken into consideration that the water under ground is in no way ventilated except through the natural means, it will readily be understood that it is not necessary to provide ventilation merely because the water has been tapped by a well.

If the origin of pollution, such as cesspools, is too near the well or the well is too shallow, not allowing enough distance for purification, there will be great danger from such sources. The greatest danger is in the shallow wells. However, these are entirely satisfactory as a source of domestic supply, providing the soil is of a sandy or gravel formation

and there are no barnyard or cesspools, for example, too near the wells. A shallow well in a limestone region is not satisfactory and should be discarded when at all possible. If it is necessary to use such, every precaution possible should be taken to eliminate the possibility of contamination.

METHODS OF PURIFICATION

Natural Methods of Water Purification

In considering the subject of water purification it is not our thought to go into detail and explain the processes that are necessary to accomplish a pure water supply, but to deal with the subject in a general way that we may appreciate what is necessary in this line.

We will first take note of the methods used by Nature in purifying water. Nature's method of obtaining chemically pure water is by evaporation and condensation. The result of this method is the snow and rain water. About three-fourths of the earth's surface is covered with water. The sun acts as a great furnace and the atmosphere as a vast still. In this way we see that a great quantity of water is distilled and returned to the earth in a state of purity. It is estimated by Summerville that "186,240 cubic miles of water are annually raised from the surface of the globe in the form of vapor chiefly in the intertropical seas."

It is entirely erroneous to assume that the impurities in water are eliminated by freezing. Ice may contain great quantities of impurities, even so-called pathogenic germs. It has been shown that many germs are not destroyed by freezing. It is true, however, that ice will be purer than the water from which it is taken.

There are certain processes which result in a purifying influence as water is crystallized. As ice forms it excludes suspended matter and even under certain conditions will exclude dissolved substances. It will thus be seen that even though

ice may not be pure, the danger from its use is greatly reduced. It is not advisable to use water from melted ice for drinking purposes.

Manufactured ice is supposed to be free from impurities, but this is not necessarily true. If ice is produced artificially from distilled or properly filtered water it will naturally be pure, provided it does not become polluted in the process of manufacture.

At one time it was believed that river water would become pure in a flow of seven miles. This, however, could not be true since the distance of the flow is of less importance than the time required for the flow.

The greatest aid in this method of water purification comes from the impurities mixing with the volume of water as it flows. The impurities become diluted and if sufficient time elapses the bacteria and microörganisms will die a natural death.

The principal process involved in self-purification of water is the oxidation of nitrogenous organic matter which is a chemical process. In the course of time the microörganisms die as a result of the biological action. Then there is the effect of dilution, sedimentation, especially in lakes and still water, and the effect of sunlight.

Food for the bacteria is lessened as a result of the destruction of the organic matter through oxidation. The minute infusoria, amœbæ and water worms feed upon organic matter and bacteria and thus aid in the process of purification. The plants known as algæ play a very important part also in water purification. They take up the organic substances and perform other functions similar to the vegetation on the land. The purifying effects of water vegetation is very important.

One of the chief sanitary safeguards in Nature is dilution. A small amount of pollution may be quickly diluted by a volume of water until it is practically harmless. In its concentrated state, however, there might be enough poison, the

strength of which would be greater than the internal resistance of the individual. This would produce toxic conditions, or it might even be great enough to produce subluxations.

Sedimentation is another of Nature's methods that is of great value. This process has been aped by man in the coagulation produced by the use of chemicals. This action is largely mechanical. During the process of sedimentation it is only the suspended matter that settles; but it is maintained that the bacteria and microörganisms become entangled and are carried to the bottom and in this way the water is freed from more than simply the mechanical impurities. If allowed to remain in storage a sufficient time, the harmful bacteria will die a natural death. There are processes, however, that take place during the time of storage which are objectionable, but these relate more to the taste or smell of the water than to the production of harmful ingredients.

During sedimentation there is a natural settling of the suspended particles. Not only is the desired result obtained in freezing the water of solids, but as the suspended matter sinks to the bottom many of the bacteria will also be carried down. Sedimentation, however, is not a method that can be used promiscuously. It is usually employed in connection with some other method; with a slow sand filter, for example, or when mechanical filtration is used.

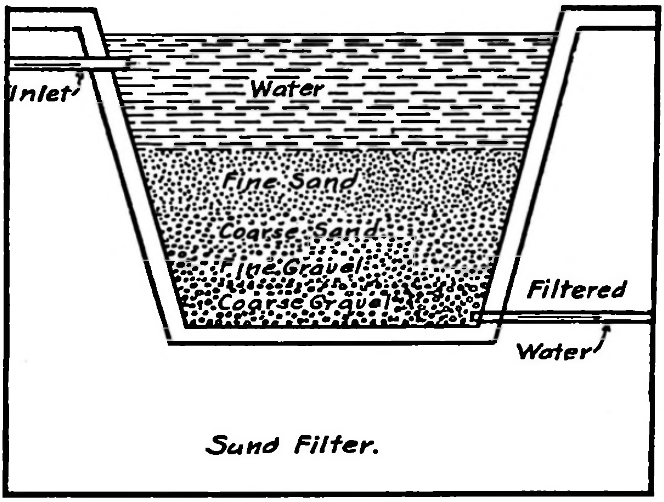
Sunlight is Nature's greatest germicide. Direct sunlight destroys germ life and renders much aid in maintaining sanitary environmental conditions. It has a purifying effect upon water in this way. When the water is in motion or during times of turbidity great good is accomplished from a sanitary standpoint by the direct rays of the sun.

Artificial Methods of Water Purification

The only way to obtain chemically pure water is by distillation. However, since this method is very slow and expensive, it is not at all practicable for the purification of even

a private water supply, and since a chemically pure water is not required for drinking or other domestic purposes it would be entirely unnecessary to provide it. Again, distilled water is not desirable for drinking purposes since its taste is insipid until it is aerated.

When only a small amount of water is required it may be freed of organic poisonous substances by boiling. This will not, however, render water that contains lead and other stable chemical substances injurious to health safe for domestic use.



Sand Filter.

The dissolved gases are given off by boiling and this leaves the water with a flat taste which may be improved by aerating; this may be done by stirring or by placing the water in a jar and shaking it.

Filtration is by far the most practicable method of water purification. There are many different methods used. The two most used are known as the natural and mechanical.

Under what is known as the natural methods, the sand filter seems to have precedent. The efficiency of this filter depends upon the material used, the velocity of the water

through the filter and the care, such as proper cleaning which the filter receives.

As a matter of information the student should become somewhat familiar with the general construction of a sand filter. The size of the filter, that is, the area it covers, will be governed by the amount of water to be filtered per day, which in turn will depend upon the demands. The greatest objection to a slow sand filter is that a very large tract of land is required to provide sufficient surface for the percolation of the water.

The bottom and sides of the filter-beds are water-tight and are constructed of cement with proper drains to carry off the filtered water. A layer of very coarse gravel is placed on the bottom of the filter, then on top of this is a layer of fine gravel. This is then covered with fine sharp sand about three feet deep. Ordinarily the entire filter medium is from four to six feet deep.

On top of this layer of fine sand a thin scum is formed which increases the efficiency of the filter, its action being biological. As this scum accumulates it becomes necessary to remove it. This is done by special devices. It is necessary to remove only a small portion of the sand, for it will be clean immediately below the surface. This process is continued until the layer of sand has decreased in depth to about twelve inches when it is replenished with new, or with polluted sand which has been removed and thoroughly washed with filtered water.

The filter is first filled by admitting water from beneath for the purpose of forcing the air out. The depth of water is kept about three feet above the sand.

The rate of filtration is controlled and kept at a velocity of about two inches per hour. At this rate a filter of one acre area will provide about 3,000,000 gallons per day.

A first class slow sand filter should free the water of 99% of the bacteria. Hygienists claim that filtered water should

not contain more than 100 bacteria to a cubic centimeter. Water from a new filter or one that has just been cleaned should be tested before it is used. By this method one can determine whether the desired results are being obtained.

It may be necessary to store the water in reservoirs before it is passed through the sand filter for the purpose of sedimentation. This will rid the water of the small particles of sediment which is contained in the turbid water. If turbid water is passed through a sand filter the smallest particles will pass on through with it. This causes a tendency to fill the filter with clay and other substances.

Instead of the water passing slowly through the sand, it is forced through in mechanical filtration. The sand is contained in cylinders or tanks and the water is forced through either as the result of gravity and weight of the water above or by mechanical means. Before it is passed through the sand in the mechanical filter, it is treated chemically to coagulate and precipitate the suspended impurities. This process is not only mechanical in the sense that it is accomplished by means of certain machinery, but the action on the water is mechanical. There is no bacteriological action which is so essential as this mechanical action in the process of water purification.

The mechanical method of water filtration has not been found to be as satisfactory as the slow sand filter process, although very large amounts of water may be filtered in much less time. One great disadvantage of this method is that the filters require such frequent cleaning and in this respect are very expensive to maintain.

Chemical purification is not considered by some hygienists as a satisfactory method for purifying large water supplies. There are many objections to this method. Even though the water is freed from the impurities it has received in its natural course, it is laden with chemicals that may be as injurious to health as the impurities themselves.

The chemicals used are: Chlorine, bromine, copper sulphate, metallic iron, ozone and sodium bisulphate.

Swimming Pools

In connection with the subject of water a word relative to the sanitation of swimming pools will not be out of place. There are many municipal swimming pools in operation and while they are intended to improve the sanitary conditions, they may at the same time become a great menace to hygiene if they are not properly conducted.

No individual should be allowed to enter a swimming pool without first having taken a shower bath with a liberal use of soap. No one should be allowed in the pool who is infected with skin dis-eases of any kind, ulcers, running sores, conjunctivitis, or veneral dis-eases.

The water should be properly filtered when it enters the pool and there should be a constant process of disinfection. There should be not only right construction, but also fit maintenance of the pool. The swimmer should be properly instructed relative to swimming pool sanitation.

SEWAGE AND REFUSE DISPOSAL

Methods of Sewage Disposal

One of the greatest problems the hygienists and sanitary engineers have to solve is the disposal of sewage and refuse without contaminating the water supply and in other ways rendering the environment unhealthful.

The methods used for the immediate removal of sewage may be either the dry method or the water method. By far the more common one in towns and cities is the water carriage system. In small towns, however, the more prevalent way is to provide a house some distance from the dwelling which contains a privy vault.

Where sewage is removed by the water method and carried through sewers to the waterways, such as rivers and lakes,

the great problem which the sanitary engineers have to solve is how to dispose of the sewage and not pollute the water supply of the city.

When there is a sufficient amount of water to insure proper dilution sewage may be emptied directly into it without treatment. But where there is a limited amount of water, as in a small stream, and a very large amount of sewage to be disposed of, the water may become overloaded and thus the supply of other towns become polluted. When sewage is disposed of in the ocean, oyster beds may become contaminated as well as the bathing beaches.

Sewage Purification

It is considered cheaper and at the same time satisfactory from a hygienic standpoint to depend more upon proper filtration than upon any other method of purification.

There are many different methods used for sewage purification. Sewage may be screened. This frees it from the larger particles. It is then placed in tanks and by a slow process of sedimentation relieved of a large amount of the suspended matter that passes through the screens. After these processes it may then be carried to fields for subsurface irrigation. It is carried through porous tile pipes ten to eighteen inches below the surface and two feet to three feet apart. In this way the sewage seeps through into a sandy soil. An acre will take care of the sewage from 150 to 250 people a day. This method can not be used at all in clay soil.

The crude sewage may be applied to the surface of the land and carried by means of ditches, but this is not considered satisfactory. Sand filters are also used, but they require frequent cleaning and renewing.

According to Price the most desirable method of sewage disposal is known as the septic method. In this method the sewage is sorted and the action that follows is bacteriological. The bacteria present act in the absence of air or oxygen. The

sewage thus undergoes a process of decomposition, fermentation and purification.

The next step is to pass the sewage that has come from the septic tank through open sand filters very slowly. These sand filters must be properly cleaned and renewed at regular intervals and must at no time be overloaded. This makes the effluent from the filter beds entirely free from germs and harmful matter. It is not necessary for us to consider the construction of these septic tanks. There are any number of different types, but the results are supposed to be the same. The construction of such tanks is in the province of sanitary engineering and not in that of practical hygiene.

Price states that the water which comes from the filter beds after the sewage has first been through the septic tank is free from injurious substances, is capable of supporting life and that even the drinking of it has been known not to be followed by injurious results.

Refuse Disposal

Another great problem is the disposal of refuse such as ashes, garbage, and in the larger cities, street sweepings. It is estimated by Whipple that in the larger cities like New York the refuse will be in round numbers a ton per capita per year. This is an enormous amount of material and the disposal of it becomes a great problem. This is not only of hygienic importance, but also one of economical significance.

The collection of waste material is objectionable from the social viewpoint; also an accumulation of ashes and dust will irritate the eyes and respiratory tract, while piles of garbage and other filth are conducive to the breeding of flies and mosquitoes. Such collections result also in the development of ill-smelling odors and unsightly streets and alleys.

There are different methods used to dispose of this waste material. It may be collected and burned. This method is called incineration. Or the refuse may be collected separately

and disposed of. When it is to be disposed of separately there are usually city ordinances which require the householder to keep the garbage and ashes separate and they are then collected by the city in separate wagons. In most cities tall garbage cans are required and the garbage is drained and wrapped in paper, the ashes are placed in cans or containers. They are used for filling in low lands while the garbage is taken away and buried or burned.

For the collection of garbage specially constructed wagons or carts are used. The garbage must be collected frequently and at regular intervals before it becomes decomposed and gives off objectionable odors. The wagons must be properly cleaned for the same reason. In the removal of ashes and other refuse, care should be taken not to create a dust and the wagons should not leak so as to litter the streets and alleys.

CHAPTER VIII
SCHOOL HYGIENE

SCHOOL HYGIENE

SCHOOL BUILDING

Site

Stairways

Corridors

Basement

Schoolroom

- SIZE
- LIGHT WALLS
- FLOORS

Lighting

- AMPLE WINDOW AREA
- SHADES HUNG FROM BOTTOM

Ventilation

- PURE AIR INDISPENSABLE
- EFFECTS OF VITIATED AIR
- ARTIFICIAL MEANS NECESSARY

Heating

- LOCAL HEATING INADEQUATE
- HOT WATER OR STEAM HEAT BEST

School Desks

- ADJUSTABLE
- PROPER PLACING OF CHAIRS

Blackboards

- SLATE, BEST MATERIAL
- LOCATION OF
- DUSTLESS CHALK

Charts

- PRINTED MATTER LARGE
- GLASS SURFACES AVOIDED

Cloakroom

- ONE FOR EACH CLASS
- PROVISION FOR DRYING WRAPS

Water Supply

- AMPLE WATER
- FOUNTAINS

Toilets

- proper ventilation
- automatically flushed
- matron in charge

PERSONAL FACTORS

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- recreation necessary
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CHAPTER VIII

SCHOOL HYGIENE

SCHOOL BUILDING

Site

In the consideration of school hygiene we will first briefly discuss the school building. Its site should be carefully chosen. It should be reasonably high; the soil should be porous, if possible, and properly drained to insure dryness. The building should not be located near a manufacturing plant or other places where there is much noise, smoke, gases or fumes. The buildings should be plain but artistic, and should by all means be modern, fireproof, substantial and sanitary.

The building should be surrounded by sufficient yard room to provide ample playground. There should be plenty of shade but not so many trees that there will be an interference with the sunlight and ventilation of the grounds. Some attention should be given the beautifying of the yards, for it must be remembered that the entire child goes to school—physical, mental and spiritual natures must all be developed.

The number of stories a modern school building should have is somewhat of a mooted question; however, it is quite obvious that there are many objections to a building of more than two stories. A two-story building certainly is an advantage and especially is this true when the pupils have to change for their different classrooms.

Stairways

Stairways should be of ample width, allowing pupils to pass up and down without danger of crowding. The risers should be no more than six inches and the treads not more

than twelve inches. Where the pupils are compelled to go from one floor to another several times a day it is much better to have inclines instead of stairs.

Corridors

The corridors should be wide enough so that the children in passing and repassing will not have to crowd. They should be at least ten feet in width and should be supplied with plenty of doors for exits, ventilation and light and also windows for ventilation and light. When practicable the corridors should be along the north side. This insures sufficient lighting and at the same time does not interfere with the lighting and ventilating of the schoolroom. It is more important that the direct rays of the sun be admitted to the schoolroom than to the corridors.

Basement

The basement should be well protected from dampness; therefore it should be well ventilated and properly heated, as well as arranged so that the direct rays of the sun may reach at least a part of it.

The basement should not be used for classrooms unless it is for machine shops, or workrooms. It should not be used for playgrounds or gymnasium, but may be used for bathrooms and toilets. It should occupy the entire space under the building.

The Schoolroom

In planning the building it must be remembered that the schoolroom is the unit of the building and therefore must receive primary consideration. The entire building should be a collection of schoolrooms properly arranged.

The schoolroom should be about twenty-five feet by thirty feet with not less than a thirteen foot ceiling; this size room will be large enough for thirty pupils and no teacher should

be required to take care of more than this number in a class. There should be plenty of entrance and exit doors for each room.

The interior of the classroom should be attractive but plain, the surfaces smooth; the junctions of ceiling and floor with walls should be concave. All mouldings, projections, ledges where dust and dirt could lodge should be eliminated. The walls should be of such a color as to absorb as little light as possible and prove least taxing to the eyes. A light green-gray is favored. The walls must be so treated with paint or some other method employed so as to be readily washed or otherwise cleaned. White ceilings which reflect the light are best. Floors are made of hard wood in narrow planks with matched joints, or they are dovetailed. This may be laid over false floors of boards or reinforced concrete. The walls, floors, ceilings and partitions must be proof against sound, dampness, fire, vermin, and dust.

Lighting

The lighting of the schoolroom, the amount of glass surface or window area, will be governed by the aspect, the location of the building, direction from which the light is admitted, shape of the room and the proximity of other buildings or objects which might obstruct the light. The window area must be ample to insure sufficient light in every part of the room even on dark, overcast and cloudy days. The rule is that the window area should be at least one-fourth of the floor space and it is practically impossible to have an excessive window area for the light may be toned down and softened by shades and awnings. Prism glass is more practicable because it refracts the light and gives a more even distribution over the entire room.

Most of the light should be admitted over the left shoulder of the pupil so as to eliminate annoying shadows, but it is not necessary that all the light come from the left. The windows

should reach to the ceiling and the height of the sill from the floor should be about four feet. Light should never enter from the front and strike the eyes of the pupil. The upper fourth of the window furnishes one-third of the light, also the best light; therefore it can readily be seen that window shades should not be hung from the top but from the bottom, and should be rolled upward. In nature the light comes from above, hence this being natural it is consequently best.

Ventilation

Pure air is absolutely indispensable for mental work. Much time and energy is wasted by teacher and pupil in trying to work in vitiated atmosphere. The educational results obtained in the school will be influenced more than has been conceded by the character of the air the pupil and teacher are forced to breathe. Vitiated air will produce sluggishness, headache, listlessness, inattention, lack of energy and a depression of mental vigor which will prevent the child from doing his best work. The same influence will be felt by the teacher and the result will be inefficiency in instruction.

Natural means of ventilation should not be relied upon since it is difficult to get a sufficient amount of fresh air into the rooms in winter time without creating objectionable drafts which interfere with heating. Regardless of the method employed in ventilating it is a good plan to open all of the doors and windows occasionally during the day and flush the rooms with fresh air. At such time the children should exercise or employ some means to prevent them from taking cold.

Schoolhouses should be provided with the combined plenum and vacuum system and operated in conjunction with the heating plant in cold weather. In this way the air that is admitted can be regulated not only as to quantity, but also the velocity can be controlled and likewise the humidity and temperature.

Heating

The relation between ventilating and heating must be kept in mind. It is not only a question of providing a proper amount of pure air, but also a question of the proper temperature of the air. A poorly ventilated room is always more difficult to heat and an improperly heated room is very difficult to ventilate. Local heating should never be used in a schoolroom except when impossible to provide better means.

The best arrangement for heating school buildings is hot water or steam in connection with the ventilating system in which the air is passed over hot radiators before being forced into the classrooms and corridors. This is supplemented by heat from the radiators placed in proper locations throughout the building. In this way the temperature of the room may be kept at the proper degree and at the same time the air circulation and the humidity properly regulated. Best work is accomplished by the children when the temperature is kept at about 68° F.

School Desks

The furniture most important to the health of the child is the desk and the desk chair. These should be very carefully adjusted to the child; if this is not properly done the child will have a tendency to assume a faulty posture which will favor the development of curvatures of the spine and other physical defects.

The height of the desk should be such that the pupil will not find it necessary to raise the shoulder in placing the arm on the desk to write, or so low that he will have to bend forward. The top should slope at an angle of about fifteen degrees. The best distance from the eyes is from twelve to fourteen inches.

The height of the chair from the floor should be very carefully adjusted to the student and it should allow the feet to

rest comfortably on the floor; that is, when the student is seated the thighs should be level and the leg at right angles to the thigh, thus allowing the feet to rest on the floor. If the chair is too low there will be too much weight thrown on the back of the thighs while a chair that is too high produces too much flexion of the lumbar region of the spine. The slope of the seat should be slightly backward and downward and the depth about two-thirds the length of the thighs. The back of the chair should slope slightly backward and should be made to fit the curve of the back.

The chair should be placed far enough from the desk so that the abdomen will not touch its edge. When properly adjusted in most cases the edge of the chair will project under the edge of the desk about one inch. In the lower grades it is best to adjust the seats and desks to the child twice a year.

Blackboards

The best material for blackboards is slate, which furnishes a surface that is not shiny and will not reflect the light. They can be washed and easily kept clean and thus lessen the nuisance of dust. Blackboards should never be placed between windows. When possible there should be no windows on the same wall because when pupils are looking at the board there should be no light shining in their eyes. The blackboards are best placed opposite the principal light.

Dustless chalk is best and the use of colored crayons made of arsenic or sulphide of mercury should be prohibited, since the dust from these crayons is poisonous.

The blackboards should be plainly visible to all the pupils and care should be taken that all writing or other work on the board is large enough for the pupils to see without eye strain. The distance of each pupil from the board should be governed by the strength of vision.

Charts

If charts are used the printed matter should be large enough for the pupils to read without undue strain on the eyes. Glass surfaces should be avoided to prevent objectionable reflections and all figures and illustrations should be plainly visible, but objectionable bright colors and clashy combinations should be avoided.

Cloakrooms

In school buildings having no lockers the pupils must place their wraps in a cloakroom. There should be such a room for each classroom. The cloakroom should be well ventilated, lighted and heated and should be connected with both the hallway and the classroom.

Special attention should be given the wet clothing and provision made for drying the same. This can be nicely taken care of during school hours by the janitor. Children should never be allowed to sit in damp clothing during the school hours. All dressing-rooms, cloakrooms and lockers should be kept clean.

Water Supply

It is very essential that an ample supply of fresh, pure water be provided. The old drinking cup is a thing of the past, except possibly in some of the smaller country schools, and it is fortunate that a more modern method has taken its place. The supply fixtures, such as the drinking fountains, should be conveniently located and in a part of the building easily accessible to the pupils. A sufficient number of fountains should be provided so there will be no necessity for crowding. They should be placed in a well lighted and properly heated portion of the building and special care taken that the floor does not become damp and unsanitary. The fixture which allows a constant bubbling of the water is most

satisfactory, since it eliminates the necessity for the child to operate and hence lessens the temptation for the child to play in the water.

Toilets

Ample toilet facilities should be provided and separate toilets arranged for the girls and boys. The toilets may be placed in the basement of the school building, but special attention must be given to their proper ventilation. They should be kept so clean that it will not be necessary to use deodorizers; they should be constantly and automatically flushed. The floors should be of cement to allow thorough washing every day and the urinals of slate or some other hard, non-absorbent material. In the girl's toilet the seats of the water closets should not be too high. Where practicable there should be a separate toilet for the little girls and stools provided with U-shaped seats. This will assist very materially in maintaining cleanliness. The toilets should be well ventilated and lighted. This is of special importance and should receive the most careful attention. A matron should be in attendance to help care for the kindergarten children and also those of the lower grades. The toilets at all time should be under supervision of a competent, dependable person.

PERSONAL FACTORS

Function of School Life

A large part of the child's life is spent in the schoolroom and it must be remembered that it is that part of the child's life when he is most susceptible to environment and is therefore most easily influenced mentally, morally and physically. The entire child goes to school, therefore the function of the school is to develop the physical and moral as well as the mental.

Youth is the time of unrest and intense activity and the schoolwork should be so arranged that the energies of child-

hood and youth may be directed so as to develop the pupil into a symmetrical adult. With such intense activity a great amount of energy is used up; thus it is clear that the child needs plenty of sleep and the proper amount of good, nourishing food and if he is deprived of these he can not do his best work mentally.

Age of Beginner

We have not yet fully realized that our present school system, well organized as it is, has certain ill effects on the health of the children. Many of the reasons are peculiar to the circumstance under which the child must attend school and can not be relieved, but there are many that can be corrected and in time will be. Children are often sent to school at too early an age and as a result the growth is retarded and in some cases results in an actual defective physical development. The physical development is often retarded by prolonged fatigue. This fatigue may be the result of improper ventilation, forced attention to subjects that are too difficult, strict discipline, lack of sufficient relaxation and many other factors connected with the ordinary school.

One of the greatest mistakes in our modern system of education is sending the child to school too young. Six years of age is plenty young; seven years old is better. Even at this age some are not sufficiently sturdy to endure the mental and physical strain of the schoolroom and the application to the studies that is usually exacted of them.

Play Periods Necessary

The school affords an environment that is entirely different from that which the child has been accustomed to; therefore the beginner should be allowed much liberty and should not be compelled to remain in his seat more than one-third of the time. This should be divided into short intervals, alternating work and play. It must be remembered that the small

child is active; therefore it is imperative that he be given various exercises that will call into play the different muscles of his body. This will have a tendency to relieve the fatigue from sitting at the desk. When children first start to school they usually lose weight and become more or less nervous during the first few days or weeks.

The child should be allowed sufficient free time during each day for play and for the development of initiative. The amount of home work required should be very carefully considered and regulated according to the capacity and ability of the child; yet care must be taken or the especially bright child will be overworked and will not be given enough time for play and the development of a real childhood.

Peculiarities of Child Considered

The peculiarities of the child should be considered and the curriculum arranged accordingly. The methods of study should receive proper consideration as well as the methods of teaching. Special classes should be arranged for the backward students. Many cases of backwardness or mental deficiency are due to the child's inability to see clearly or hear distinctly, and when these conditions are corrected the child will be normally bright. Many times a child is unjustly disciplined because of some physical defect or handicap which should be corrected.

Statistics show that tests and examinations have a detrimental effect upon the health of the pupils. Experiments have shown that children lose weight during such tests and examinations; that they are restless at night and suffer loss of appetite. All these have a bearing upon the health of the child.

Posture

Attention should be given the habits of the children and especially the posture of the child as he sits in the seat at his desk. A faulty posture may result in an adaptative curvature

of the spine which in later years will do much harm. The sitting posture is of more importance than the standing posture since the child sits so much more than he stands.

The pupil should not be allowed to sit in a stooped position over his desk as this cramps the chest and interferes with respiration, makes the heart action labored and produces round shoulders; it also tends to produce a kyphosis in the dorsal region of the spine. If a child persists in sitting in this stooped position and finds it difficult to sit in the proper position, attention should be given the spine, for subluxations will be found which are interfering with the transmission of mental impulses to the muscles of the back, thus making it difficult for the child to sit in the normal posture. Or it may be defective eyes which make it difficult for the child to see his work and he therefore stoops that the work may be brought nearer the eyes. In this case a cervical subluxation will be found and when properly adjusted no more trouble will be experienced. It may be this tendency to stoop is the result of fatigue; to overcome this he should be given periods of rest and relaxation from time to time during school hours; or this fatigue may be due to poor elimination from the kidney place subluxations.

Recess

During the morning and afternoon sessions the pupils should be given a recess for fifteen or twenty minutes, and when the weather will permit all the children should be required to go outdoors and engage in some form of play or exercise, properly supervised by a thoroughly competent individual. This will not only benefit the pupils physically, but will also make the mind more active and aid very materially in their mental development. In addition to this exercise, some time during the day the windows should be opened, except possibly in extremely cold weather, and the teacher and pupils should engage in some form of calisthenics. This

will tend to keep the pupils in a fit physical condition and mentally alert for the balance of the day.

The school grounds should be provided with modern equipment for the proper development of the children physically and should be supervised by kind and well trained attendants. Every school should have a well equipped and properly supervised gymnasium.

School Dis-eases

At one time the school was thought to be largely responsible for the spread of dis-eases among children, but this idea is changing in later years. In reality there are no specific school dis-eases. The dis-eases that have been so referred to are merely those abnormal conditions incident to childhood and youth. Rosenau gives a very interesting article on this subject. He says: "Parents naturally come to regard the school as a veritable pesthouse for the spread of communicable diseases of childhood—especially measles, whooping cough, mumps, diphtheria, scarlet fever, common colds, etc. Many of these dis-eases prevail in epidemic form during the summer time, when school is closed, and under other circumstances which show the epidemics may be independent of school attendance. It is difficult to determine just what part is played by the commingling of the pupils in school in the spread of such dis-eases and what part is due to other factors. Some dis-eases take a sudden jump in the autumn with the opening of school. Further, these dis-eases are not contracted by the school children alone, but are carried home to the other members of the household, and thereby create secondary foci. This problem of the communicable dis-eases and the school is far from solution; the spread of these dis-eases has not been conquered by medical inspection, and their relation to school attendance is one that needs careful observation and study."

Thus we see that the cause of school dis-eases has not been answered, and we find in this article that which strengthens

the contention of Chiropractic—that the cause of the dis-ease is in the child and not something introduced from the outside.

The environment of the school creates a necessity for certain internal adaptative actions, and if this adaptative action can not take place the result will be an abnormal condition peculiar to the necessity for adaptation. The lack of adaptation may result in incoördinations of the respiratory tract; incoördinations of the eyes, involving not only the sight but the different tissues and secretions of the eyes; incoördinations involving the heart, throat and mouth and many conditions of eruptions of the skin. Especially do we find deformities and incoördinations of the spine and spinal column.

In diagnostic terminology these conditions would be called bronchitis, bronchopneumonia, pleurisy, myopia, catarrhal conjunctivitis, trachoma, cardiac dis-eases, such as endocarditis, etc. The mouth, nose and throat dis-eases would be coryza, adenoid growths, enlarged tonsils, tonsilitis, nose bleed, etc. These conditions could all be prevented or corrected by adjusting the causative subluxations.

Prophylaxis

It is not necessary for us to go into an explanation of the spinal column and how subluxations are produced. It is sufficient at this time to call the student's attention to the fact that subluxations are often produced, and especially is this true during childhood. The children are subject to falls during their play at school and they are most likely to produce subluxations. This being true, the children should be analyzed periodically to determine the subluxations and then they should be adjusted. When parents realize the good that is to come from such procedure they will take their children to the chiropractor and have their spine palpated and the subluxations adjusted. When this becomes a universal practice there will be a marked decrease in the so-called school dis-eases or children's dis-eases.

CHAPTER IX
INDUSTRIAL HYGIENE

INDUSTRIAL HYGIENE

GENERAL CONSIDERATIONS

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CHAPTER IX

INDUSTRIAL HYGIENE

GENERAL CONSIDERATION

Definition

That branch of hygiene dealing with industries is of very great importance. This will be readily recognized when we consider that practically the entire population is involved in some sort of gainful occupation.

Industrial hygiene is concerned in creating conditions in industry which will prevent accidents, promote public and personal health by eliminating adverse influences, and in creating environmental conditions which will prolong the worker's life by improving the conditions under which he labors. Public health, mortality and morbidity are influenced more by the environmental conditions in the occupations than by any other factor in human life. At least two-thirds of the entire human life is spent in some occupation and the danger of life, limb and health is well known to all.

The various industries differ largely in their effects upon the workers, the mortality in some being greater than in others; accidents are more numerous in some than others, some occupations being more hazardous. Some dis-eases occur more frequently in certain occupations. The environment may necessitate a greater adaptation in one part of the body than in another; a very dusty work, for example, will affect the respiratory tract while another occupation will affect a different part of the body.

Effect of Occupation upon Health

It is obvious that occupations have a certain effect upon the adaptative processes of the body as well as producing

traumatic conditions from accidents, which result in total or partial disability, sudden death, or acute or chronic conditions from poisoning for example. In the industries there may be such adverse environments as to draw so heavily upon the adaptative forces that the body will be reduced to a greatly weakened state. The personal health of the individual enters as a conditioning factor, as well as do his peculiarities and personal weaknesses.

Personal Factors

The individual with low vitality, poor nutrition and poor elimination will be affected to a greater extent in some occupations than in others. The person with a subluxation at lung place, lessening the resistance of the tissues in this zone, will find that an occupation which necessitates breathing air laden with dust will affect the lungs because of their already weakened condition. Many accidents which jeopardize the health and life of workers result from carelessness or from a lack of knowledge about the devices employed.

Choice of Occupation

Great care should be exercised in the choice of an occupation. This should not be left to chance nor to the ignorant fancy of the youth. The occupations which will best suit the idiosyncrasies of the individual both mentally and physically should be selected. Many lives are shortened because of the unwise choice of occupation. The individual with defective lungs should not select a dusty trade, nor the physically weak person a trade which requires an enormous amount of muscular strength. In other words, a trade should be carefully selected with a view to the weak and strong points of the individual.

In this question of a choice in employment the sex should be taken into consideration. While there are many occupations in which women are as compctent or more competent

than men, yet there are several factors to be weighed. Taken as a general rule, women are not as strong physically as men. There are some occupations which have a very detrimental effect upon the reproductive organs. Statistics show that women are more easily affected by industrial poisons than men. Congestion of the reproductive organs during menstruation is increased and if women are compelled to work at certain occupations during this menstrual period, they will certainly find it detrimental to their health.

It is a recognized fact, according to many authorities on the subject, that there is a larger percentage of abortions and miscarriages among women in industries than among women in domestic life. The infant mortality is also very much higher. Many abortions and miscarriages result from the effects of industrial poisoning, as well as from heavy and continuous work.

Effect of Labor upon Children

The most injurious effects from occupation are those upon children since they are more susceptible to the ill effects than adults. The child should have every advantage for the development of all parts of his body that there may be no interference with its proper growth. Attention should be given to his mental and moral development. These things can not receive proper attention if the child is forced to labor under adverse conditions just at the time when the body is developing.

Many occupations are such that curvatures of the spine are produced and different parts of the body overtaxed. Child labor should be prohibited. There is no labor so expensive to our country as child labor. If our children are not given an opportunity to develop physically, mentally and morally, we will suffer in citizenship in the next generation. There is bound to be a deterioration from such procedure.

The organs of the child are peculiarly susceptible to the

effects of overwork and fatigue; the entire body is in the process of development and its development may be retarded and its growth seriously hindered. It is a most excellent thing to keep the child employed and active, but there certainly should be a means of protecting him from the avarice and greed of heartless employers. The best way to do this is to keep him out of gainful employment until there has been sufficient physical development to insure against overtaxing the young body.

Place of Work

The influence of the occupation upon health will be governed not only by the character of the work, but also by the environment in which the work is performed. Whether it is indoor or outdoor work, whether it is an active or sedentary occupation, and whether there are extremes in the temperature, humidity, air pressure or light, or whether the work is on the surface or below it as in mines, are all factors. The position of the worker, the length of the working hours, the physical, mental and nervous strain all have a bearing on health. Outdoor work is preferred, especially for those who are inclined to pulmonary or respiratory disorders, because of the difference in the purity of the air. Outdoor workers suffer less from fatigue and their mortality rate is lower.

Effect of Posture

Posture of the workman is not without its effect upon the health and its bearing upon industrial hygiene is very important. There are many conditions that have their beginning in the occupation, such as faulty development of different parts of the body, curvatures of the spine, and especially those which are adaptative. Many subluxations are produced by posture assumed during long hours of work. In analyzing such cases chiropractically, the history of the occupation and the posture assumed should be carefully considered so that in

adjusting the subluxated vertebræ there may be no opposition to the adaptative processes of Innate Intelligence in her endeavor to compensate for the faulty posture.

Sedentary occupations such as typing, bookkeeping, shoemaking, engraving and tailoring result in lack of muscular activity and produce characteristic occupational disorders and deformities. It is not natural for an individual to remain in any one posture for the greater part of the day. Innate needs to have the body more or less active so that the proper adaptative processes can be carried on within the body.

Sitting constantly at a desk will create a tendency to stooped shoulders and thus cramp the respiratory organs. The result will be a lack of proper oxygenation of the blood which will have its effect upon the metabolic processes of the body. There will be a sluggishness of the liver and other vital organs, and a tendency to anemia, constipation, general lack of muscular tone and low vitality.

Active occupations exercise the natural processes of the body and create a necessity for the action of Innate in all parts of the body. Activity keeps the muscles in tone and makes the processes of elimination more active. Activity is one of Nature's laws and is essential in the vital expressions of life in the body. This is shown by the provisions Nature has made for such activity. Especially are the active occupations to be preferred over the sedentary for young people and for those up to the age of forty-five or fifty. After this age the sedentary occupations are not so detrimental.

Fatigue

Fatigue comes as a result of overwork and is a purely personal factor since the amount of work that may be performed before producing fatigue will vary in different individuals. Fatigue is produced by an accumulation of toxines and waste material in the body when katabolism is greater than anabolism. This may be brought on by overtaxing the body to the

point where it is impossible for Innate Intelligence to rebuild the tissues as rapidly as they are being torn down. It can readily be seen that if there should be an accumulation of waste material from faulty metabolism due to interference with transmission, fatigue would be produced sooner and with less work than in the individual normally excreting the poisons.

If one part of the body or one set of muscles is overworked fatigue neurosis will be produced. There may be loss of motor function due, not to interference with transmission of motor mental impulses, but to the fact that the organ, usually a muscle, becomes an unfit medium for the expression of the mental impulses. A good illustration of this is writer's cramp, and cramps among typesetters and telegraphers. In these cases, however, there are usually local subluxations that should be adjusted.

HYGIENE AND SANITATION OF INDUSTRIAL ESTABLISHMENTS

Space Per Individual

In some states the legislatures have established a minimum of 400 cubic feet of space for each individual, but this is not sufficient in some occupations and under some conditions. The amount of space per workman must of necessity be governed by several factors: namely, character of the work performed, character of the building, the hygienic conditions of same, the type of ventilation used, whether natural or mechanical, and the methods of heating and lighting. In some trades and under certain conditions 1000 cubic feet space per workman would not be excessive.

Character of Buildings

When practicable the building should be constructed especially for the kind of work to be carried on within. It should

be fireproof and of a material that will lend to the hygienic demands in industry.

We do not want to pass over this subject without calling the student's attention to the effect which may be produced by the physical, mental and nervous strain under which the work is performed. If the worker is under great tension a great amount of energy will be used up and fatigue will appear early. This will have a marked effect upon the individual and tend to lessen his efficiency. If work is performed under great physical strain, the muscular activity is greater than the muscles are able to express. Then there will be not only fatigue but actual injury done the muscles and other structures. Under such conditions the vital organs will also be overtaxed. This may result in dilatation of the heart, hernia, aneurysms, or in a general weakened condition of the body. The results of mental strain, responsibility and worry are not without their adverse effects.

Lighting, Heating and Ventilating Work Places

Industrial hygiene should be concerned about the temperature, humidity, air pressure, light, ventilation, and heating of the work place. The building should be well lighted. If possible natural light should be provided even though the first cost is considerably greater than that of artificial lighting. There will not only be a better grade of work done in natural light and with less eye strain, but the general health of the workmen will be better. If artificial lighting is used it should be electric light, since it produces less impurities and provides a more even light. The light should be evenly distributed and of a proper distance from workmen so that it will not be reflected directly into their eyes. If the occupation takes the worker out of doors then these features can not be controlled, but in this event attention must be given to the clothing of the workman. Sudden changes in the temperature should be avoided as much as possible. Innate is capable of adapting

the body to extremes in temperature, but must be given a sufficient amount of time in which to bring about these changes. Men may work in the frigid temperature or in the torrid temperature and if properly clothed and acclimated will suffer no ill effects.

In many industries the laborers are forced to work in artificially high temperatures. Blast-furnace workers, glass blowers, miners, bakers, and stokers must remain in extremely high temperatures. The body may be adapted to such temperature, but the effect of the continued expenditure of energy necessary to bring about this adaptation will show adverse effects upon the body. There is a tendency to respiratory disorders and a thickening of the blood plasma which disrupts the circulatory system. Heat also has a detrimental effect upon the eyes and there is a tendency to rheumatism.

Air of a high relative humidity is objectionable from a hygienic standpoint because it interferes with perspiration and evaporation. Workers constantly exposed to atmosphere that is too damp will have a tendency to incoördinations involving the bodily secretions and respiratory disorders. The ill effects of such an environment are rather marked and if it is necessary to maintain a high relative humidity because of the processes carried on there must be special provision to guard the health of the workers. This may be accomplished by short hours and frequent periods of rest and relief from the high humidity.

Normal air pressure is fifteen pounds to the square inch, but there are many industries in which the work must be done under a greater or a less pressure. Mountain climbers are subjected to decreased air pressure while caisson workers and divers must work under greatly increased air pressure. Decreased air pressure is especially detrimental to those suffering from cardiac disorders, and may in some cases result in death. The effects of increased air pressure have been elaborated

upon in another chapter and the student is referred to that section.

The location of the work is important. Subsurface work is more detrimental to health than surface work unless special precautions have been taken to make the place of work conducive to the expression of life. Subsurface workers such as miners are subjected to great heat, lack of proper light and ventilation, accumulated gases, dampness and poisons. There is also greater danger from accidents and explosions.

Industrial Dusts

In a trade in which much dust is produced there should be proper mechanical ventilation. The vacuum and plenum system should be employed. There is no factor in the industrial life more detrimental to the workman than that forcing him to breathe vitiated air laden with dust and other impurities produced by the processes employed in the trades.

The extremely dusty trades should be separated from the less dusty ones and special provision made to carry away the dust. It is often possible to substitute machinery for handwork in these trades. When the laborers are forced to work in very thick dust they may be protected in a measure by the use of respirators worn over the mouth and nose. These will catch some of the dust and act as filters.

It is often possible to place hoods directly above the machines in these trades and by means of a vacuum fan the dust is carried out through tubes.

The effects of dust upon the worker depend upon many factors. These might, however, be classified as conditioning factors in the individual and the character of the dust inhaled.

Dust from metals and minerals may produce mechanical injury to the membrane of the respiratory tract because of the sharp edges. Inhalation of dust might also bring about catarrhal conditions and coughs. There may be deposits of dust in the bronchi and even in the parenchyma of the lungs

from long exposure to and inhalation of dust. This may result in consolidation and other conditions which may be purely adaptative on the part of Innate Intelligence to compensate for the presence of the foreign substances.

In F. Hoffman's Bulletin of the Bureau of Labor, Vol. LXXIX, he gives the following classification of dusty trades according to the character of the dust produced:

"Group I—Exposure to Metallic Dust: Grinders, polishers, tool and instrument makers, jewelers, gold leaf and brass workers, printers, engravers and pressmen.

"Group II—Exposure to Mineral Dust: Stone, marble and cement workers, glass blowers, glass cutters, diamond cutters, potters, plasterers, paperhangers, moulders, core makers and lithographers.

"Group III—Exposure to Vegetable-fiber Dust: Cotton ginning, textile, linen, hemp, cordage and paper manufacturers, weavers, spinners, hosiery knitters, lace makers, jute and wood workers.

"Group IV—Exposure to Animal and Mixed Dust: Furriers, taxidermists, hatters, silk, wool, and worsted workers, carpet, rug, rag, and shoddy workers, hair mattress workers and upholsterers."

The mortality rate from pulmonary tuberculosis and other respiratory incoördinations is very high in the dusty trades.

INDUSTRIAL POISONS

In the case of poisonous gases and fumes the necessity becomes even greater for proper prophylactic measures. The methods used in dusty trades may be here employed, but with greater care. All poisonous materials should be eliminated as far as possible and less objectionable material substituted. This may be done in a great many instances without decreas-

ing the value of the article manufactured. An illustration of this is in the substitution of red phosphorus for the use of the more poisonous yellow phosphorus in the manufacture of matches. This eliminates danger from phosphorus poisoning.

Price states: "The chief industrial poisons are lead, arsenic and mercury, although phosphorus, copper, zinc, brass, and chromium poisoning are frequently met with in various industries."

Lead Poisoning

The symptoms produced by lead poisoning are: lead colic in acute cases, loss of appetite, cramps, pain in the joints. There will be bluish lines found along the edge of the gums; wrist drop and loss of motor function in the hands and feet; arteriosclerosis, indigestion, restlessness during sleep, anemia, lead palsy, loss of strength and weight and constipation. The patient experiences a disagreeable sweetish taste, and there will be a grayish pallor and pinched expression of the face. In severe cases there may be blindness, great fatigue, apoplexy, insanity and death.

The greatest danger from lead comes in the form of dust or fumes and therefore the poison enters the body principally through the respiratory tract, but it may enter through the digestive tract and through the skin.

Prophylactic measures include devices to protect the workmen by means of respirators, but special effort should be made to keep the air in the breathing zone free from the dust and fumes. Since the poison may be taken in through the skin, special provision should be made to protect the hands and arms in fingering the materials. The workmen should exercise the greatest cleanliness and precaution to prevent ingestion of the lead into the digestive tract. Care should be taken that it is not brought into the mouth by the fingers or by pipe, for example. There is a high mortality from pulmonary tuberculosis among lead workers.

Arsenic Poisoning

The mouth, lungs and skin are the portals of entry for arsenic into the body. Arsenic poisoning is characterized by catarrhal inflammation of the eyes and respiratory tract, anemia, neuritis, gastritis, and degenerative changes in the liver and kidneys. Many of the symptoms of arsenic poisoning resemble those of lead poisoning such as gastric disturbances, anorexia, anemia and loss of strength. There may be progressive muscular atrophy, eczematous eruptions and ulcers of the lips, nostrils and in the folds of the skin.

Arsenic is used in the manufacture of wall paper, artificial flowers, textile fabrics; by taxidermists and as a preservative for hides; it is also used in different preparations to kill insects and parasites.

Mercurial Poisoning

Mercury enters the body through the digestive and respiratory tracts and through the skin. The symptoms usually manifest in this kind of industrial poisoning are headache, gastric disturbances, stomatitis, metallic taste in the mouth and fetid breath; there is swelling and ulceration of the gums that cause the teeth to become loose, and there may be an excessive flow of saliva with a swelling of the submaxillary glands. In severe cases there may be tremors, paralysis, melancholy and loss of memory.

Mercury is used in the manufacture of incandescent lamps where they employ mercury pumps, in the manufacture of barometers and thermometers, in the felt and fur industries, in the manufacture of pharmaceutical preparations and chemical works, and in photography.

Methods used to prevent mercurial poisoning are almost identical with those used in lead poisoning. Special devices should be provided to keep the air in the breathing zone free from the fumes. This can best be accomplished by providing

a proper system of mechanical ventilation. The workmen should wear rubber gloves to lessen the possibilities of the absorption through the skin. The workmen should also practice cleanliness and exercise care that mercury is not carried into the mouth by the hands which should be thoroughly washed before eating.

Phosphorus Poisoning

The industrial poison of next importance is phosphorus. This poisoning is confined almost entirely to the match industry. There are two kinds of phosphorus, the yellow or white, and the amorphous or red. The yellow is poisonous and is used in making the "strike anywhere" matches. This, however, is being replaced by the non-poisonous, or more harmless red phosphorus. The safety matches contain no phosphorus and are harmless.

Phosphorus poisoning produces gastric disturbances, bronchial catarrh and caries of the teeth with necrosis of the lower maxillary. Other bones of the body may also be affected by necrosis.

Brass, copper, zinc, and bronze workers are also affected by the dust and fumes from these poisons. Brass workers suffer with brass founders' ague in which there are chills, vomiting, headache and general depression.

Chromium Poisoning

Chromium is also responsible for industrial poisoning. It is used in the manufacture of dyes and in the coloring of wall paper and fabrics. It affects the mucous membrane lining the nose and throat and produces an inflammation of the eyes and ulceration of the skin.

CHAPTER X
DEFINITIONS

DEFINITIONS

Dis-ease
Classification
Acute and Chronic
Stage of Exposure
Period of Infection
Stage of Incubation
Period of Invasion
Degree of Infection
Contagious
Infectious
Morbific Agents
Pathogenic Germs
Non-pathogenic Germs
Communicability
Host
Parasites
Commensal
Antibiosis
Symbiosis
Antibodies
Antigens
Saprophytes
Obligate Saprophytes
Septicemia
Toxemia
Sapremia
Epidemic
Endemic
Sporadic
Pandemic
Fomites

CHAPTER X

DEFINITIONS

Dis-ease

Webster defines dis-ease as, "an alteration in the state of the body or of some of its organs, interrupting or disturbing the performance of the vital functions, or a particular instance or cause of this; any departure from the state of health presenting marked symptoms." In using this word chiropractically it is always hyphenated to indicate that it is a condition wherein there is a lack of ease. Incoördination is the term used in Chiropractic, meaning a lack of coördinate action in the body which is caused by interference with transmission of mental impulses.

Classification

Dis-eases are usually classified as constitutional and environmental. A constitutional dis-ease is one that is due to defects in the structures of the body such as dis-ease of digestion, while enviromental dis-eases are attributed to extrinsic environmental conditions. The infectious dis-eases are given in this class. Chiropractically all dis-eases are brought on by interference with transmission of mental impulses caused by defective mechanism of the spinal column. The so-called environmental dis-eases are chiropractically the result of the lack of adaptation to enviromental conditions.

Acute and Chronic

Dis-eases are also considered to be acute or chronic. A dis-ease is in the acute stage when there is a "hot box" found at the causative subluxation. When adaptation has taken place and the "hot box" has disappeared, the condition is in the stage of chronicity. Taut fibers will then be present

and by their presence the palpation and location of the major subluxation may be verified.

It is well for the student to understand what is meant by such expressions as the stage of exposure, the period of infection, the stage of incubation, the period of invasion, the degree of infection, even though we have no particular reason to use such terms in our chiropractic explanations of dis-ease.

Stage of Exposure

The time during which the person is exposed to the morbific agents is known as the stage of exposure.

Period of Infection

The period of infection is the time during which the pathogenic germs actually enter the body.

Stage of Incubation

The stage of incubation is the time during which the morbific agents develop within the body and for the time being have overcome the natural resistance. The incubation period varies greatly in different so-called contagious dis-eases, it being governed largely by the character of the invading germs and the general health of the patient.

Period of Invasion

The time during which the germs remain in the body is called the period of invasion.

Degree of Infection

The vital resistance of the body, the portal of entry and the character of the invading germs determines the degree of infection.

We wish again to call the student's attention to the fact that these expressions are not used chiropractically to explain the cause of dis-ease nor the different stages through which dis-ease passes.

Contagious

A contagious dis-ease is one that is thought to be transferred from one individual to another by personal contact. From the etymology of the term (contingere, to touch) we would conclude that only such dis-eases as syphilis would come under this category. But as the term is generally understood it includes such dis-eases as smallpox, measles and chickenpox.

Infectious

An infectious dis-ease is one that is supposed to be conveyed from one individual to another indirectly through some medium. Typhoid fever has been given as an infectious dis-ease.

Today it is generally considered that the terms, contagious and infectious, do not have a precise meaning which will scientifically differentiate them, for most of the so-called communicable dis-eases may be conveyed in many different ways. The so-called infectious dis-eases may be contagious and the so-called contagious dis-eases are infectious; so we see the terms lack scientific precision and this has led to confusion many times.

Morbific Agents

Morbific agents are those agents which are thought capable of producing dis-ease when introduced into the body. They are of vegetable or animal origin. Those of vegetable origin are classed under the general name of bacteria. The most important are named according to their form. Those of the spherical shape are known as cocci; the elongated, rod-like form, as bacilli; and those of spiral form, as spirilli. The streptococcus pyogenes, pneumococcus and gonococcus are illustrations of the cocci. The most common pathogenic bacilli are bacillus anthracis, bacillus tetani, bacillus typhosus, bacil-

lus tuberculosis and bacillus influenzæ. The most usual spirilla are vibrio cholera asiatica, spirillum of relapsing fever and spirochæta pallida. Pathogenic action of germs upon the body may be mechanical, biological or chemical. The mechanical action is an interference with the physiological activity of the organs, causing stasis and hemorrhage. The biological action causes inflammation, infiltration and abscesses in the tissues. The chemical action is the result of the toxins formed by the action of the germs. This is by far the most important action.

Pathogenic Germs

Microörganisms are spoken of as being pathogenic and non-pathogenic according to the adaptative action produced by Innate Intelligence when they are introduced into the body. Pathogenic germs are those which will do harm to the host when introduced under certain circumstances. It has been demonstrated that a germ may be pathogenic to one host and non-pathogenic to another. A germ may be pathogenic to a host at one time and not at another, showing that immunity is not constant in the same individual. The pathogenicity of a germ depends upon the host and not upon the germ. Chiropractic has proven that germs will not harm the body unless there is interference with the transmission of mental impulses so that Innate Intelligence can not bring about the proper adaptative action to the presence of the germs.

Non-Pathogenic Germs

When there is complete adaptative action on the part of Innate Intelligence and the germs are excreted immediately without the production of symptoms or ill effects to the body, the germs are said to be non-pathogenic. This is not so much because of the character of the germs but because of the ability of Innate to excrete them as waste material.

Communicability

This term refers to the ease with which the germs pass from one host to another. Chiropractic has proven the fallacy of the theory that dis-ease is produced in this way. Patients become ill with the so-called communicable dis-eases and are not exposed to the germs that are supposed to cause the disease. It is also a proven fact that the so-called germ dis-eases develop in many cases in which there are no germs to be found in the pathological tissue.

Host

The host is an organism which affords lodgment and sustenance to parasite and commensal organisms. The invading organisms may be beneficial, they may be harmful or they may produce no effect.

Parasites

Parasites are those living organisms, either plant or animal, which live in, on, or with some other living organism, known as the host, from which they obtain their food, shelter and other advantages. They are of two classes—ectoparasites and endoparasites—and may be either plant or animal organisms. An ectoparasite is one that lives upon the outside of another living organism known as the host. The endoparasite is one that lives within the body of the host.

Commensal

A commensal is an organism which lives in or on another organism and shares the shelter and partakes of the same food as the host, but is not in reality a parasite. It is a close association of two organisms for the benefit of one or both.

Antibiosis

This is a form of parasitism which is harmful to either host or parasite or to both. By this process of antibiosis water

may be purified of many of the pathogenic germs. It is also maintained that in many instances there is but one major condition in the body at one time as a result of this process.

Symbiosis

In this form of parasitism the organisms are dissimilar, but neither is harmful to the other while the state is beneficial to one or both. Symbiosis will result in one condition becoming conducive to another condition as, for example, presence of certain microörganisms favors the development of tetanus. Germs are sometimes cultivated in symbiosis with other germs. This has been done with the germs that are found in leprosy.

Antibodies

Antibodies are bodies as the term would indicate, but refers to specific properties of the blood supposed to be produced by antigens and thought to accomplish a certain degree of immunity.

Antigens

Antigens are the substances which produce the antibodies in the blood and body fluids. These are merely terms used to designate the mechanism of immunity.

Saprophytes

Saprophytes are microscopic organisms which feed upon dead organic matter. A saprophyte is a vegetable organism.

Obligate Saprophytes

Obligate saprophytes are saprophytes which can not be made to develop under any circumstances in living tissue, but will develop in dead tissue in which they produce toxins. The diphtheria and tetanus bacilli develop in a localized area of dead tissue and produce the toxins peculiar to this condition.

Septicemia

Septicemia is a condition wherein so-called pathogenic bacteria and their accompanying poisons are present in the blood. These bacteria may develop within the blood or they may be carried into the blood from some local point where they are developing due to the condition of the tissues as a result of interference with transmission of mental impulses.

Toxemia

Toxemia is a condition caused by the absorption of toxins from the bacterial activity. This is commonly known as blood poisoning.

Sapremia

Sapremia is a condition wherein the blood contains the putrefactive products of saprophytic and non-pathogenic bacteria.

Epidemic

When a great number of people are affected in a community by the same dis-ease in a short period of time it is said to be an epidemic. An epidemic is said to obtain when dis-ease breaks out suddenly and involves a number of persons at one time. There is a wide difference of opinion as to the percentage of individuals necessarily involved to constitute an epidemic.

Endemic

A dis-ease that is limited to a certain class of people or peculiar to a certain locality or district is said to be endemic. Endemic differs from epidemic in that epidemic refers to a dis-ease that is more or less constantly present.

Sporadic

A dis-ease occurring singly or affecting only a few people is said to be sporadic.

Pandemic

When an epidemic involves a large number of people in a large number of countries, it is known as pandemic. There is a question as to whether or not the word can ever be properly used. It is claimed that the influenza epidemic of 1918-19 could really be considered pandemic in view of the fact that the condition was found in all countries.

These terms are used very loosely and are applied largely to suit the circumstances. A number of cases of a so-called contagious dis-ease occurring about the same time in a community may be considered an epidemic by some. There is no established rule designating the percentage of individuals that must be affected by the same condition in order that an epidemic may be established. An endemic dis-ease may become epidemic at certain times of the year or when a greater number of people than usual become affected. A sporadic dis-ease may become epidemic when a greater number of people become affected.

Fomites

Fomites are substances capable of absorbing and retaining infectious germs. The term is applied to inanimate objects and usually refers to bedding, especially mattresses, clothing and more particularly to woolen clothing. Such vectors, however, are not now receiving as much consideration as they did previously. It is no longer thought that such objects as books and furniture play any particular part in the spreading of so-called infectious dis-ease.

The foregoing definitions will give the student understanding of the terminology in general use. We will now take up a consideration of the study of the subject proper of immunity.

CHAPTER XI
IMMUNITY

IMMUNITY

Defined
Natural
Acquired
- active
- passive

Exhaustive Theory of Pasteur
Retention Theory of Chaveau
Various Theories
Adaptability of the Body
- environmental conditions
- carrying capacity of the nerves
- reserve energy
- vital resistance
- reduced carrying capacity of nerves
- interference with transmission

Dis-ease the Cause of Germs

CHAPTER XI
IMMUNITY

Defined

Immunity is defined as the ability of Innate Intelligence to maintain metabolic equilibrium in the body in the environments in which man finds himself; or that power of Innate Intelligence to rid the living body of poisons and invading organisms; or that resistance which is accomplished through the expression of mental impulses in the tissue cells whereby all invading microörganisms or toxins are expelled from the body, thereby enabling the normal expression of life in the body. The degree of immunity may be represented by the degree of intellectual adaptation possible in the body, and this in turn depends upon the freedom in the transmission of mental impulses through the spinal nerves. Immunity may be considered as the degree of protection which Innate is able to give the body and varies from a slight adaptation to the utmost adaptation or protection from all invading agencies.

Immunity is one of the most interesting and yet the most illusive and complicated subjects which we will have to consider from the standpoint of chiropractic philosophy, for in order to understand immunity we must understand the adaptative processes carried on within the body. From time immemorial man has made an effort to immunize himself from the ravages of dis-ease. In former times he tried to accomplish this through the use of charms which led to many superstitious practices, some remnants of which have survived to the present day. In recent years large sums of money have been expended in scientific research in an effort to discover the secret which would make the human race immune from dis-ease, .but to no avail. It is a recognized fact that great

good has been accomplished in improving conditions and creating an environment in which there might be a more perfect expression of life with less necessity for an excessive expenditure of adaptative energy. But man himself has not been made immune by these methods. The procedure has been wrong for the cause of dis-ease is not in man's environment, but within man himself. Chiropractic will accomplish the most desired end by restoring to normal the transmission of mental impulses to all parts of the body so there may be a complete adaptation to all environmental conditions that may arise. The body will then be protected from the supposedly deadly microörganisms that are accused of being responsible for human ills.

If the public could read what the hygienists have to say on the subject of immunology and could read it in the light of chiropractic philosophy they would realize that chiropractic adjustments will not only restore health to the sick, but will prevent the well from getting sick.

In order that the student may understand the subject more fully we will now consider briefly in a general way some of the former theories of immunity and then take up a careful study of the chiropractic philosophy of immunity.

On page 528 of *Preventive Medicine and Hygiene,* by Rosenau, we read: "We are still ignorant of the mechanism by which the body protects itself against many diseased states." He also gives us the idea that the mechanism of immunity varies not only in different infections, but in the same infection when under different and varying conditions.

Natural Immunity

Immunity is classed as natural, acquired and artificial. Natural immunity is that natural resistance of Innate Intelligence through the activity in the normal body whereby all invading organisms and poisons, as well as all the products of katabolism are excreted before they have an opportunity

to act upon the tissues or otherwise interfere with the vital processes in the body.

Acquired Immunity

Acquired immunity is the result of the adaptative processes of Innate Intelligence during the time the so-called dis-ease is active in the body which results in the recovery of the patient. To illustrate: During the attack of measles there is an adaptative process carried on which results in the recovery of the patient. During the process of this adaptation Innate produces changes in the body which makes possible the excretion of this kind of poison when introduced into the body in the future. It is a recognized fact, however, that having a dis-ease will not always prevent the recurrence of the dis-ease. In other words, to put it in the terminology familiar to all, having a dis-ease will not always produce immunity.

Artificial Immunity

Artificial immunity is classified as active and passive. George M. Price, M.D., in his *Hygiene and Public Health,* says: "Active immunity is produced by the following conditions: (1) Recovery from disease. (2) Inoculation with virulent living bacteria. (3) Vaccination with attenuated bacteria; (4) with dead bacteria; (5) with bacterial extracts. Passive immunity is conferred by antitoxins and serums."

The idea here presented is that the immunity is active if it is the result of a necessity for internal intellectual adaptation on the part of Innate Intelligence, and when this adaptation takes place there will be immunity from further attacks. That the passive immunity is produced by the introduction of antitoxins or serums taken from the bodies of animals in whose bodies these adaptative processes have taken place.

There is no possible way of producing immunity except by creating a condition in the body which will enable Innate Intelligence to transmit the mental impulses to the tissues in

such quantity and quality that there may be perfect adaptation carried on regardless of the character of the poison or microorganism that may be introduced into or manufactured within the body.

Exhaustion Theory

In 1888 Pasteur advanced the exhaustion theory wherein he maintained that the body which had no food for the germ to feed upon would be immune; in other words, when the food supply was used up the germ could no longer develop and grow. An illustration of this is the yeast which will cease to grow when the sugar in the culture media is exhausted. This theory was rejected but has since been revived and is now considered to have some merit. This theory comes very nearly agreeing with the chiropractic idea, which will be discussed later.

Retention Theory

Another theory is that of Chaveau, which is known as the retention theory. This is just the opposite of the exhaustion theory and maintains that the products of metabolism within the microörganisms, the excreta of the germs, form a toxin or a substance which is retained in the body of the host and protects it against the growth and development of the germs, in this way producing immunity.

That which can not be used in the metabolism of an organism will naturally be excreted, for if it is allowed to remain in the body it will impair the tissues. The excreta of the germ then can not be used in its own metabolism and is therefore a poison to the germ as well as to the host. This waste accumulates until the germ eventually is destroyed by the poison of its own excreta. This is given as an explanation of self-limited dis-eases. It is further explained by this theory that this poisonous excreta of the germ is retained in the secretions of the body of the host and acts as a protection against

further invasion, for when other germs of the same character enter the body they come in contact with this poison and are destroyed. In this way immunity is supposed to be maintained. But this is not logical, since the excreta of these germs can not be used in the metabolic processes of the human body. It is a poison and will be dealt with by Innate as such. Innate does one of two things when poison enters the body or when it is manufactured within the body. One is to eliminate it through the normal channels of excretion; the other is to produce an antidote in the form of an internal secretion to neutralize the poison. In either event the excreta of the germ would lose its potency as a germicide and could therefore have nothing to do with the production of immunity.

Various Theories

Again, it is claimed that the phagocytes perform a very important function in protecting the body against invading microörganisms by attacking, destroying and digesting them. Another theory is that the antibodies of various kinds play an important part in keeping the body free from undesirable invaders. It is also asserted that immunity is produced in a negative way by the absence of a specific affinity between the tissue cells and the toxin.

Immunity may be the result, according to other theories, of a positive factor due to the presence of antibodies which neutralize the toxins. In some cases immunity is associated directly with cell activity while in others it is resident in the blood and fluids of the body. Rosenau further says, "The unsatisfactory state of our knowledge in certain fields of immunity is well illustrated in the case of anthrax. The mechanism of protection is not at all understood in this infection, which was the first and classic illustration of a germ disease. The mechanism of immunity in common colds is also complex and obscure."

Many other authors could be quoted to show that the real

philosophy of immunity is not understood nor why a germ will seem to cause dis-ease in one individual and not in another. But this is sufficient to indicate the unsatisfactory results that have been obtained in research work along this line.

Adaptability of the Body

It is a known fact that there is a wide range of adaptability and a vast difference in the vital resistance of different individuals, and even in the same individual at different times. There must be some reason for this difference.

It is also a known fact that an individual may be apparently well one day and sick the next, although there may be no change in the subluxations existing in the spine of the individual. Environmental conditions are constantly arising which necessitate adaptative action on the part of Innate Intelligence. This action must be in addition to the normal action taking place under the normal and usual environments. In order to accomplish this increased functional activity the current must be increased to accomplish this, the carrying capacity of the nerve must be greater than the current necessary to maintain the ordinary metabolic process in the body.

Under the stress of environmental necessity it is possible for Innate Intelligence to increase the functional current of mental impulses up to the full carrying capacity of the nerve, and to augment the functional activity at the periphery to the full capability of the physical structure to express that current of mental impulses. Were it not for this possibility of increased functional activity there could be no adaptative processes in the body. In order that there may be an increase in the functional activity there must be an increase in the functional current of mental impulses. This necessitates that the current transmitted under normal conditions be less than the carrying capacity of the nerve.

Psychologists tell us there is a certain amount of reserve energy stored up in the body. Chiropractic maintains that it is not a matter of energy being stored up, but that this reserve energy is a question of increasing the functional current so as to increase the processs of adaptation in the tissues. The degree of adaptation is represented by the difference in the current transmitted through a nerve under normal conditions, and that transmitted when the full carrying capacity of the nerve is taxed. In other words, the reserve energy is the difference between the current that is being transmitted and that which it is possible to have transmitted.

As the adaptative action is increased in response to the necessity there will be, in adverse ratio, a decrease in the reserve carrying capacity of the nerve. In other words, as the current is decreased the reserve carrying capacity of the nerve is increased. The degree, therefore, of vital resistance is represented by the reserve carrying capacity of the nerve and as this is decreased there will be a like decrease in the vital resistance of the body.

Some individuals are immune from certain so-called contagious dis-eases and we are told that this is because the vital resistance is greater in them than it is in others. This statement is true, but there should be some reason for this difference in resistance and Chiropractic gives us that reason. The possibility for adaptative action in the body is decreased by subluxations in the spine and its degree depends upon the combination of subluxations, the functions involved and the organs in which the functions are expressed abnormally.

The question, however, arises that if there are subluxations in the spine, why are there no incoördinations but merely the possibility of decreased adaptation. To this question there is a specific answer. It is contained in the principles involved in and underlying the philosophy of Chiropractic, therefore it is not possible here to go into details. It can be considered from a general viewpoint only.

There may be a combination of subluxations existing in the spine and yet not enough pressure to prevent Innate Intelligence getting a current through great enough to meet all the ordinary demands of the average environment. But when subluxations do exist and a condition arises necessitating increased functional activity, Innate, because of the decreased carrying capacity, is unable to increase the current of the periphery. Hence adaptation can not take place and there is incoördination which would not have obtained if the carrying capacity of the nerves had not been decreased by the subluxation. It must be remembered that even in the normal condition when there are no subluxations, health is a question of intellectual adaptation; that dis-ease is a question of the lack of intellectual adaptation. As the possibilities of intellectual adaptation are decreased, the possibilities of incoördination are increased.

An individual will be immune so long as the carrying capacity of the nerves remain normal or so long as the carrying capacity is not decreased. Germs ingested or taken into the body will be excreted as so much waste material and will not be permitted to remain in the body. This is not only true of germs and microörganisms, but of all poisons. The carrying capacity of the nerves is limited, but in the normal condition is 100%. If the poison introduced is stronger than the internal resistance then the meeting of the two forces will produce a concussion, and if this concussion is greater than the normal resistance of the spine a subluxation will be produced. In this way an individual may be immune from one poison and not another, or from one particular germ and not another, or he may be immune at one time and not at another time. For the philosophy of subluxations being produced by poison, the student is referred to Chiropractic Library, Vol. V, Palmer, under the heading of poisons.

The particular mechanism of immunity is not so vital so long as we understand that it is produced by the operation

of Innate Intelligence, and know what is necessary to enable Innate to produce this condition.

Under the exhaustion theory of Pasteur it was maintained that when food upon which germs fed was exhausted they could no longer develop and the body in which there was no food for the germs would be immune from the germ dis-eases. Chiropractic maintains that the germ is a scavenger and feeds upon dead tissue, never upon live tissue; that there must be a proper culture media for the development of the germs and this can obtain only in tissue that is below the normal condition. Therefore, if the tissues are maintained in a state of normality by the normal transmission and expression of mental impulses, there will be no food for the germs and they will be excreted. On the other hand, if the tissues are below normal in their resistive powers, due to the interference with the transmission of mental impulses, the germs finding food and a culture media conducive to their development will remain and multiply and their excreta will act as a poison and necessitate a further process of adaptation, the character of the symptoms depending entirely upon the character of the poison produced.

It is not necessary to kill the germ that the patient may recover. All that is necessary is to adjust the subluxation or subluxations that are causing the interference with the transmission so the tissues may become normal and the germs will starve to death and be excreted as dead material.

Dis-ease the Cause of Germs

Dr. Alexander M. Ross, Fellow of the Royal Society of England, said in speaking of germs, "They are the result, not the cause, of disease. They are scavengers; their legitimate work is to clean out the sewers of our bodies."

John B. Fraser, M.D., C.M., writes, "The reasons for questioning the germ theory are mainly three, viz:

"1st. The divergent views of bacteriologists as to which germ caused the disease.

"2nd. The stronger claim of the bio-chemic theory.

"3rd. The absence of germs at the onset of disease (as the following sample cases show).

"(a) A man crossing a river broke through the ice, was rescued, later became ill, and the doctor, fearing pneumonia, tested for pneumo-cocci—there were none present; when the pneumonia developed they appeared.

"(b) After an oyster supper some men had cramps and diarrhœa, followed by typhoid fever—no Eberth bacilli were present in the first stools, but were present later.

"(c) Hurrying, a girl arrived at her shop sweating; as the shop was cold, she became very chilly; next day complained of a sore throat, but no Klebs-Loffler bacilli were found; later, when a diphtheretic patch appeared, the bacilli were present.

"Here in each case the bacilli followed the onset of the disease.

"Believing that the above germs were the result and not the cause of the diseases, tests of the germs of diphtheria, typhoid and pneumonia were made.

"The first test was whether the Klebs-Loffler bacilli would cause diphtheria, and about 50,000 were swallowed without any result. Later 100,000, 500,000 and a million and more were swallowed, and in no case did they cause any ill-effect.

"The series of tests was to decide whether the Eberth bacillus would cause typhoid, but each test was negative; even when millions were swallowed. The third series of tests showed that one could swallow a million (and over) pneumococci without causing pneumonia, or any disturbance.

"The investigations covered about two years and forty-five (45) different tests were made, giving an average of fifteen tests each. I personally tested each germ (culture) before allowing the others to do so; and six persons (3 male, 3

female) knowingly took part in the tests and in no case did any symptoms of the disease follow.

"The germs were swallowed in each case, and were given in milk, water, bread, cheese, meat, head-cheese, fish, and apples—also tested on the tongue.

"Most of the cultures were grown by myself—some from stock tubes furnished by Parke, Davis & Co., and one tube furnished by the Toronto Board of Health through one of their bacteriologists.

"As the tests were carefully made, they prove that there is not the danger from germs that bacteriologists claim; they also may stimulate other Canadians to undertake further experimental work, for the actual test on man decides the truth of the theory."

Germs Do Not Cause Dis-ease

Germs do not cause dis-ease, but they may be considered as any other foreign substance taken into the body, which can not be used in its metabolism. Any foreign substance which can not be used in the processes of metabolism will injure the tissues if allowed to remain in the body. If germs are taken into the body and if there are subluxations which prevent Innate from producing normal function in excreting these germs, and if there is waste material due to impaired metabolism, these germs will find a culture medium conducive to their development; then in their natural processes of development and metabolic processes, secretion and excretion, toxins will be formed which will result in certain symptoms from such poisons, all due to the fact that there are subluxations producing pressure upon nerves interfering with the transmission of mental impulses.

Immunity, then, is a question of keeping the body in such a physical condition that there will be no abnormal tissue upon which the germs may feed. But this would imply that in order to have dis-ease there must first be abnormal tissue

AND the germs. This, however, is not the case for there may be dis-ease without the presence of the germ, even in the so-called germ dis-eases. Dis-ease is not a question of germs being present, but it is the decreased current of mental impulses to the tissue cells.

The best way to produce immunity is to have the subluxations adjusted so there may be a normal transmission of impulses to all parts of the body so that intellectual adaptation may be at par. Immunity from any and all dis-eases may be produced by the restoration of transmission. This does not mean that after momentum has been gained dis-ease will be at once overcome and the process of restoration will be accomplished without a sufficient amount of time to enable Innate Intelligence to bring about the necessary processes of restoration. But we do mean to say that if all subluxations were adjusted the individual would be immune from all incoordinations. Still subluxations could be produced by trauma and also by the introduction of poisons into the body. In order to maintain constant immunity the individual should periodically visit his chiropractor for an analysis. By so doing subluxations that have been produced may be detected and adjusted.

CHAPTER XII
GERMS

GERMS

ORIGIN OF THE GERM THEORY AS CAUSE OF DIS-EASE
ACTION OF GERMS IN THE BODY A NATURAL PROCESS
BACTERIA
- CLASSIFICATION OF
- DIPHTHERIC GERMS IN THROAT
- FOUND EVERYWHERE

SOURCE OF COMMUNICATION
- MAN AND ANIMALS
- MEDIA OF CONVEYANCE

MODE OF TRANSFER
- DIRECT
- INDIRECT
- INTERMEDIATE HOST
- CARRIERS

CHANNELS OF ENTRY
- THE RESPIRATORY TRACT
- DIGESTIVE TRACT
- THE SKIN
- THE GENITO-URINARY TRACT

TERMS INFECTIOUS AND CONTAGIOUS

CHAPTER XII

GERMS

Origin of Germ Theory

The average individual, who thinks of the cause of dis-ease and then associates germs as that cause, probably does not realize that the germ theory of the cause of dis-ease only dates back to about 1880. He does not realize that the man who decided germs cause dis-ease died in 1895. However, it is true that as early as 1675 a Dutch lens-maker published the fact that he had manufactured a lens of such high power that "animalcules" could be seen in water. He also asserted that microörganisms could be found in feces. However, they were associated with dis-ease only in a speculative way; even Aristotle in the second century speculated on microörganisms as the cause of dis-ease, but this was only theory as he could not prove it, having no microscopes with which to study the germs nor any methods of isolating them. It was not until Louis Pasteur began his research work in bacteriology that scientists considered there was proof that germs caused dis-ease, and since that time medical science has gone to the extreme along this line.

The germ theory of dis-ease has gained such favor that great amounts of money and the very best talent have been lent to the investigations. But as time has gone on and the zenith of this doctrine has been reached, we find the theory has been questioned until today even those who were previously advocates of this theory are now doubting or rejecting it. Many questions are being raised concerning dis-ease being the direct result of the introduction of bacteria and germs into the body. It is now maintained by the best authorities, among

those who previously asserted that germs were the cause of dis-ease, that dis-ease is the cause of the germs.

Action of Germs a Natural Process

The action of microörganisms, inside as well as outside the body, is a perfectly natural process and one that has been provided in Nature as a part of her general plan. It is a natural method just the same as her method of purifying the air or the self-purification of water or any of her other beneficent processes are natural. Milk will not sour without bacteria. Putrefaction is the result of the activity of the bacteria. Did it ever occur to you that the process of putrefaction is one of Nature's methods for keeping our environment sanitary? Even this process is obtained only through bacterial action. Bacteria are always present in the intestinal tract and aid in intestinal digestion.

The term is applied to all microscopic organisms, whether vegetable or animal. Vegetable microörganisms are known as bacteria while animal microörganisms are called protozoa.

Bacteria

Bacteria are the simplest form of vegetable life and also the smallest. They vary greatly in size and are grouped in three classes according to their shape: cocci, which are minute spherical cells, bacilli, rod-shaped cells, and spirilla, which have a spiral form.

There are three types of bacteria: the rod or bacillus, the sphere or coccus, and the spiral or spirillum, all so named because of their shape. They divide by what is known as fission, each cell dividing into two and so on. When the conditions are favorable this division may take place as often as every thirty minutes.

They may be produced artificially in a proper culture medium. It is generally supposed by the layman that the bacteria are very hardy little creatures and will develop in the

body and cause dis-ease under the least provocation. This, however, is quite erroneous for they are very delicate and their propagation is difficult. The temperature and moisture must be exactly right and they must have just the proper kind of food or they will not multiply. They will live in an environment, sometimes for a great length of time, that is not suitable for propagation.

Diphtheric germs are found in the throat of the average person. These germs, however, will not multiply nor develop until the tissues of the throat are depleted. The tissues then become pathological and form food for the bacteria, but even then they will not develop unless the temperature and moisture are exactly right. Bacteria multiply very rapidly when there is waste material in the tissue of the throat which furnishes food and when the environment is conducive to their development. The tissues weakened by the decrease in the flow of mental impulses are not able to expel the germs and they accumulate, not as the cause of dis-ease, but as a result of dis-ease. The bacteriologist examines a culture from the throat of the patient and because he finds the germs present he says the germs cause the dis-ease, since no other cause is known; strange to say, however, when the patient is adjusted and the tissues become normal it is not necessary to kill the germs. They will starve to death and Innate will excrete them.

Bacteria are found everywhere and in almost everything. In food, water, on the walls and floors, and in the pores of the skin. All life is due to the action of these bacteria. The action of the germs soon produce fermentation and putrefaction of dead animal tissue and of vegetables, thus reducing them into simpler elements which furnish nourishment for plant life. The plants furnish food for animals and man, and thus we have what is known as the food cycle. So we see that vegetation is dependent upon bacterial action for its supply of food. If the bacteria were all destroyed there would soon

be an end of food and plant life would die because of starvation. If there was no plant life the animal kingdom would be robbed of its food supply. Thus we see the important function performed by the bacteria.

The so-called dis-ease germs may be found in the healthy body, but that body does not have the dis-ease merely because that germ is present. If, however, there is a subluxation which interferes with the transmission of mental impulses the tissues soon become pathological and proper environment is created for the development of the germ. Then this germ propagates and soon there is a large number present. These germs will, however, disappear as soon as the tissues become normal. In other words, when the incoördination is restored to coördination the germs disappear.

Source of Communication

There are two recognized principal sources of communicable dis-ease common to man, namely, man himself and the lower animals. It is interesting to note that most of the so-called communicable dis-eases are peculiar to man alone. They are not found in the lower animals except as they are communicated by man for experimental purposes. It is true that domesticated animals are more susceptible to dis-ease than wild animals.

From the standpoint of hygiene there must be a distinction made between the source of infection and the media of conveyance. Man and animals are considered the main sources of infection. Environment is regarded a source of infection. It is maintained that water, food, air, and soul form a media for conveyance, but they are not considered sources of infection. Rosenau, one of the leading hygienists, states that "most of the microörganisms causing the communicable diseases of man are frail and soon die in our environment, as in the air, soil or water." Notwithstanding this fact, some still maintain that these frail little germs cause dis-ease.

Modes of Transfer

Hygienists assert that germs are transmitted either by direct or indirect means. The vehicles of transmission may be man himself, animals, or anything that will carry the germs from one person to another. Price says, "The most frequent and demonstrated mode of infection is by direct contact of dis-ease with the healthy, of the persons surrounding the infected one, such as physicians, nurses, etc."

We must differentiate between the mode of transmission, or, as it is sometimes called, the mode of infection, and the channel of infection. The channel of infection is the passage through which the germs enter the body. In tuberculosis the channel of entrance might be the respiratory tract, through the skin, or by means of the digestive tract, while the mode of infection or mode of transfer might be by such means as milk or sputum.

There are two principal modes of transference: (a) direct or contact infection, (b) indirect infection. Under this second heading would be included carriers or intermediate host. Direct or contact infection is from person to person and may be accomplished through discharges from the nose and mouth or other excretions from the body. There are many dis-eases supposed to be transferred from person to person by direct contact. Such dis-ease as diphtheria, tuberculosis, scarlet fever, syphilis, gonorrhea and skin dis-eases belong in this class. It is also asserted that these same dis-eases may be transmitted from person to person by intermediate agents. For example, typhoid germs may be transmitted in fecal matter into the water supply and ingested into the body. The gonococci may be deposited upon fomites, such as bedding, and transferred to other individuals. From a chiropractic standpoint these incoördinations will be produced only when there is interference with transmission of mental impulses, preventing intellectual adaptation taking place in the body.

Indirect infection is accomplished from person to person through such means as water, food, air and soil. It is claimed by medical hygienists that dis-eases may be transferred great distances by these vehicles. However, some of the so-called pathogenic germs are short lived and will therefore not infect after any length of time.

It is affirmed by some that a person may be a carrier of a dis-ease and not himself be suffering from the dis-ease. As, for instance, there are cases on record where an individual has been a carrier of diphtheria, having the germs in his own throat and from his throat the germs have found their way into the throats of others. In other words, there were pathogenic germs in his body which were doing no harm to him, but when they entered the body of others caused dis-ease. People have been found with every imaginable dis-ease germ and yet have themselves been perfectly well. Such persons are known as "carriers." From a chiropractic viewpoint this condition is very easily explained. In such people the transmission of mental impulses is sufficient to permit Innate Intelligence to maintain a sufficient degree of adaptation to prevent the propagation of the germs, but not sufficient to enable Innate to excrete the germs as waste material.

The course followed in preventive medicine in these cases is isolation of the individuals and the strictest sanitation. Their occupations are controlled so that they will not handle food intended for other people. In these ways danger from carriers is lessened.

Pathogenic bacteria live in the bodies of infected persons, in their secretions and excretions, and in the discharges of the body, but they are not found free in Nature. The principal vehicle of transmission is man himself. He is also the principal recipient of infection. Germs may be found in the various secretions such as those from the eye, ear, nose, throat, from wounds and in the pus from abscesses; they may be found also in sputum, urine and in the solid excretions. In

these ways they may be transmitted from one individual to another. They may also be carried by animals, insects, food, milk, water, air or any other mode or vehicle. The most common mode of transference, however, is from person to person.

Channels of Entry

The channels through which germs enter the body are grouped as follows: (a) respiratory tract, (b) digestive tract, (c) skin, (d) genito-urinary tract.

Since the air contains many germs at all times, it can readily be seen that the respiratory tract forms an excellent portal of entry through the mucous membrane of the eyes, nose, mouth, throat and lungs. It is asserted by those who believe that germs cause dis-ease, that the germs of diphtheria, scarlatina, measles and pneumonia enter the body through the respiratory tract. It can readily be seen that since the air contains bacteria at all times, even of the so-called pathogenic type, that they would be taken in with every breath and if these germs were the cause of dis-ease every individual would have all kinds of dis-ease. It is quite evident that these germs do not remain in the body except under the most favorable conditions, obtaining only when there is interference with transmission which makes the tissues abnormal.

It is maintained by exponents of the germ theory that the greater number of germ dis-eases are caused by the germs that enter the body through the mouth into the alimentary tract. There are many pathogenic and nonpathogenic germs contained in the food that we eat and the water that we drink, and yet these germs do not produce dis-ease in every individual, yet the exponents of the germ theory hold that typhoid fever, cholera, dysentery and many other dis-eases are transmitted to the body through the alimentary canal by means of food and water.

As a portal of entrance for germs into the body, the skin

is considered of least importance since the germs will not penetrate the normal skin under ordinary circumstances. If there is an abrasion or wound infection may be produced by the entrance of germs, but this will take place only when there is sufficient interference with transmission of mental impulses to make it impossible for Innate Intelligence to bring about proper reparatory processes. Animal parasites may find a portal of entrance through the skin.

The genito-urinary tract furnishes a portal of entrance into the body for such germs as those of gonorrhea, syphilis and tuberculosis, either by direct contact or through intermediary agents. Infection of the body is by means of some of these entry channels which differ with the different bacteria. The bacteria may be entirely innocent when entering one part of the body, yet when they enter through some other portal they may be considered pathogenic. In other words, some germs will thrive in one part of the body but not in some other part.

Terms Infectious and Contagious

The terms infectious and contagious are not clearly defined and have no scientific precision. "A contagious (contigere, to touch) disease is one that is readily communicable—in common parlance, 'catching.' Formerly a contagious disease was considered as one which is caught from another by contact, by the breath or by effluvia. A contagious disease implies direct or personal contact. If contagious diseases are limited to those contracted by direct contact or touch, as the etymology of the word signifies, only syphilis and diseases similarly contracted would be contagious. As a matter of fact, smallpox, measles and influenza are types of contagious diseases, and the term is now usually understood."

"An infectious (inficere, to put in, dip in, or mix in) disease is usually considered as one not conveyed directly and obviously, as in the case of contagion, but indirectly through

some hidden influence or medium. In the days when specific febrile diseases were regarded as caused by miasmata and noxious effluvia, the term 'infectious' and 'miasmatic' diseases were more or less synonymous. Typhoid fever was often taken as a type of an infectious disease. Malaria was the type of miasmatic disease." (Rosenau, *Preventive Medicine and Hygiene.*)

Most authors consider that an infectious dis-ease may be contagious and a contagious dis-ease is also infectious. Contagion implies more of a personal contact as a mode of transfer, while infection implies more of an indirect mode. The communicable is more specific, but does not refer to any particular mode of transference.

There are many so-called communicable dis-eases, yet let it ever be remembered that if Innate Intelligence is operating at par in the body there will be an immunity from these diseases, although the germs that are supposed to cause them will still exist.

CHAPTER XIII

DISINFECTION AND FUMIGATION

DISINFECTION AND FUMIGATION

DEFINITIONS

- Disinfection
- Sterilization
- Antiseptic
- Insecticide
- Asepsis
- Germicide
- Deodorant
- Fumigation
  - FORMALDEHYDE
  - SULPHUR DIOXIDE

MEANS OF DISINFECTION

- Natural Means
  - DILUTION
  - DESICCATION
  - SUNLIGHT
  - TIME
  - ANTIBOSIS
- Other Agents
  - FIRE
  - DRY HEAT
  - BOILING
  - STEAM
- Other Disinfectants
  - CARBOLIC ACID
  - CREOLINE
  - LYSOL
  - SAPROL
  - BICHLORIDE OF MERCURY

CHAPTER XIII

DISINFECTION AND FUMIGATION

DEFINITIONS

Disinfection

When an object is contaminated with so-called pathogenic germs it is said to be infected. To disinfect an object it is necessary to destroy the microörganisms. The destruction of all so-called pathogenic germs, whether in the substance of the object or on its surface, is called disinfection. All lower forms of animal and vegetable life are destroyed in sterilization, while in disinfection only the germs which, from the medical standpoint, are the cause of dis-ease, are destroyed. The agent used in disinfection is known as a disinfectant or germicide.

Sterilization

The destruction of all germ life in or on an object is known as sterilization. From the standpoint of hygiene sterilization is unnecessary except in dis-eases such as anthrax, tetanus, and other spore-bearing dis-eases, the spore being highly resistive and not so easily destroyed as the vegetative cells. Sterilization will disinfect but disinfection will not necessarily sterilize. Disinfection is thoroughly efficient in almost all cases. Sterilization destroys all life.

Antiseptic (Anti, against, and septos, putrid)

An antiseptic prevents putrifaction but does not necessarily destroy the microörganisms. A substance may act as an antiseptic by delaying or preventing the processes of decay and decomposition, but still not be a germicide. In other words, anything that will hinder the development of germ life

acts as an antiseptic. Thus cold has a preservative action, although it will not destroy the microörganisms. A disinfectant may be diluted and used as an antiseptic. A 10% solution of formalin is a good disinfectant and will kill bacteria in a relatively short space of time, but formalin in a solution of one to fifty thousand will be a very good antiseptic. The germination of anthrax spores may be prevented by the use of bichloride of mercury in as weak a solution as one to three hundred thousand, but it will require a solution of one to one thousand to destroy the spores. A disinfectant is also an antiseptic but an antiseptic is not a disinfectant.

Asepsis

Asepsis is an absence of putrifactive bacteria. This may be accomplished without the use of germicidal agents by cleanliness which excludes all so-called pathogenic germs.

Insecticide

An insecticide is an agent capable of destroying insect life. Many of the germicidal agents are also insecticides. There is a great difference in the resistance of different insects. Formaldehyde is a good germicide but is not an insecticide. There are four ways of using insecticides. In liquid form, powder, vapor form and those placed in food to be eaten by the insects.

Germicide

A germicide and a disinfectant are the same for they both destroy germ life. Many germicides are so powerful that they completely sterilize or destroy all life.

Deodorant

A deodorant is not in any sense a disinfectant and has no power to destroy germ life. It is an agent which neutralizes unpleasant odors. A disinfectant destroys germs but does

not necessarily destroy odors. A deodorant must not be confused with a substance having pungent odor which merely substitutes one odor for another. A deodorant destroys the unpleasant odor.

Fumigation

Fumigation is a means of disinfection by use of fumes or gases, and is used generally for the purpose of destroying germ life only on the surface of objects. For this reason fumigation should not be used as a substitute for disinfection. Formaldehyde and sulphur dioxide are used largely for fumigating purposes.

Of these two gases formaldehyde is the better since it is not poisonous, does not injure the surface of objects and will not damage the most delicate fabrics nor destroy colors. Sulphur dioxide is very destructive and therefore less desirable. However, all the gaseous agents lack sufficient penetrative power to accomplish more than a surface disinfection. Formaldehyde is a good germicide and this adds to its efficiency.

To obtain the desired results in fumigating there must be special attention given the preparation of the rooms or spaces to be fumigated. All objects in the room should be so exposed that the gas may readily get to all surfaces. All furniture and other objects should be moved into the room away from the walls and all doors and drawers of bureaus and boxes should be opened so the gas may find free access to every nook and corner. Much of the gas may escape through cracks and crevices, therefore special care must be exercised that these openings are all properly closed before the fumigation is started. In view of the fact that the gas is non-destructive there is no harm done even to the most delicate materials.

The best results are obtained from the formaldehyde when the temperature of the room is 65° F. or over, with a relative humidity of at least 60%. While formaldehyde has the power

to kill spores it is not considered sufficient to disinfect in such dis-eases as anthrax and tetanus.

Formaldehyde gas kills all forms of microörganisms almost instantly but is not particularly destructive to higher form of life. It produces a marked irritation in the mucous membrane of the respiratory tract which may result in death to animals exposed to the gas for any length of time. It is not considered an insecticide.

In fumigating a room with formaldehyde great care must be exercised that the individual does not remain in the room after the gas begins to be liberated. After the process of fumigation has been completed the windows and doors should all be opened that the gas may escape. It is always best to have the doors and windows open from the outside so that it will not be necessary for any one to go into the room until the gas has blown out.

AGENTS OF DISINFECTION

Physical Agents

The physical agents of disinfection are sunlight, electricity, pressure, dry heat, burning, boiling, and steam.

Chemical Agents

Chemical agents of disinfection are divided into two divisions—gaseous and liquid disinfectants. The gaseous disinfectants are: formaldehyde gas, sulphur dioxide gas, hydrocyanic acid gas, chlorin, oxygen, and oxone.

Some of the most important liquid disinfectants are metallic salts, bichloride of mercury, silver and zinc salts, coal-tar creosote, carbolic acid, phenol, lysol, creolin and formalin.

MEANS OF DISINFECTION

Natural Means

Nature's means of disinfecting are by dilution, sunlight, desiccation, time and antibiosis. The direct rays of the sun are

Nature's greatest germicide. Few of the microörganisms will live in the direct rays, but there are none that will withstand them for more than a few hours. Germs can not withstand the effect of dryness. Thus we see there is in Nature that which works as a most efficient germicide. The combination of sunlight and dryness forms a most desirable means of disinfection. When germs become attenuated through the effects of these natural processes they do little harm when introduced into the body.

One of the most important adjuncts to the work of disinfection is personal cleanliness and sanitation of the environment.

Other Agents

Fire is not a practical disinfectant. It can be used only with those articles that are of little or no value since the article that is being disinfected is destroyed. The burning of all refuse and garbage is by all means the best method. Burning is the most satisfactory and cheapest method in disinfecting sputum and other excreta from the body, and in disposing of articles of little value saturated or contaminated with such.

The dry heat method of disinfecting requires specially built apparatus such as dry air sterilizers. This form is not practicable for use in disinfecting fabrics and other materials that are destroyed or injured by extremely high temperature required to destroy the germ life. Metals are easily injured by this method as they are likely to be scorched. All forms of life are destroyed in an hour's time when exposed to a temperature of 150° C. Such articles as glassware will withstand this heat or even higher and may be thoroughly sterilized in from one to two hours. This insures proper penetration and sufficient heat to completely destroy all life.

Boiling is one of the most satisfactory and easiest methods of disinfecting. Continuous boiling for an hour in water at

100° C. will result in the destruction of most germs of the so-called infectious dis-eases. There are some of the spores, such as those of anthrax and tetanus, that will survive the most strenuous processes of boiling. However, most of the germs will be destroyed before the boiling point is reached.

Boiling is the best method to be used in disinfecting bedding, body linen, towels and other fabrics which will not be harmed by this process. There is a great variety of articles that may be disinfected in this way, such as utensils and bed pans. The surfaces of the floors, walls, beds, and other objects may be cleansed with boiling water. In this use it is advisable to add some disinfectant to the water.

Steam is not only a disinfectant but it is also a sterilizing agent. All forms of germ life, including spores, are completely destroyed. It is therefore our best known disinfectant. There are many objects that are injured and some ruined by steam, such as silk, wool, furs, oilcloth and rubber goods, and articles containing varnish or glue. There is danger from staining and running of colors. Disinfection may be either with streaming steam or with steam under pressure. For the use of streaming steam no particular device is necessary. Some means of providing the steam and some place to hang or place the objects and articles to be disinfected are the two essentials for this method. It is not necessary to have an air-tight place. To use steam under pressure there must be a specially constructed apparatus. There are many such devices on the market and they are used in institutions where it is found necessary to disinfect with steam.

Sterilization may be accomplished in twenty minutes with steam at about one atmosphere of pressure which will give a temperature of about 120° C. A temperature of about 125° C. is obtained with the pressure at about twenty pounds to the square inch. This reduces the time for sterilization to about fifteen minutes.

Other Disinfectants

Carbolic acid which is a good antiseptic but a comparatively mild germicide is another disinfectant. It has very little penetrating power and is of most value in a 3% to 5% solution for washing floors, walls and woodwork. The cresoles are more powerful and effective disinfectant than carbolic acid. The most common of this group are: creoline, lysol, and saprol. Their use is about the same as that of carbolic acid. Bichloride of mercury may be used in a solution of from one to two thousand, to one to five hundred and forms a very good disinfectant. It kills germs but corrosive sublimate will kill spore-bearing bacteria only in a solution of one to five hundred. In weaker solutions it forms a very good antiseptic. Lime forms a very good disinfectant, especially for excreta, cesspools and cellars.

CHAPTER XIV

HYGIENE AND SANITATION IN THE SICK ROOM

HYGIENE AND SANITATION IN THE SICK ROOM

Factors in Normal Expression of Life

- UNHINDERED TRANSMISSION
- NORMAL METABOLISM
- PROPER NUTRITION
- PROPER DIGESTION

Importance of Environment

- INFLUENCE OF CHANGE
- NECESSITY FOR ADAPTATION

Function of Educated Mind

Need for Conserving Energy

- TEMPERATURE OF SICK ROOM
- VENTILATION
- LIGHTING
- FURNITURE AND HANGINGS
- BED AND BEDDING
- DISPOSAL OF EXCRETA

Hygienic Measures in So-called Communicable Diseases

- QUARANTINE
- DISINFECTION OF STOOLS, URINE AND SPUTUM, LINENS

Chiropractic Cause of So-called Communicable Diseases

- INTERFERENCE WITH TRANSMISSION
- EXPLANATION OF PRESENCE OF GERMS
- NO COMPLICATIONS UNDER ADJUSTMENTS

CHAPTER XIV

HYGIENE AND SANITATION IN THE SICK ROOM

Factors in Normal Expression of Life

In case of incoördination in the body there are always existing conditions which require educated adaptation. It is the study of these conditions to which the sickroom hygiene and sanitation must be directed.

We will first consider the environment necessary for the normal expression of life in the body. Unhindered transmission of mental impulses alone will not give us the processes of metabolism. To have normal metabolism in the body oxygen must be carried to the tissue cells and there must be an uninterrupted transmission of mental impulses. Nutrition is derived from the food taken into the body and oxygen from the air is breathed into the lungs. The mental impulses are transformed in the brain by Innate Intelligence and transmitted by efferent nerves; hence the necessity for a proper amount of food, a sufficient supply of pure air and unhindered transmission. But the nutrient elements contained in the food are not in a state to be utilized by the tissue cells when taken into the body; therefore it is necessary that the food be broken up by the process of digestion that it will be rendered usable by the tissue cells.

This process of digestion requires a great expenditure of internal energy or, in other words, a functional activity of the mental impulses. Thus it is seen that the body as a machine must be supplied with the material necessary to keep it in repair and running order, and that this material is taken in and prepared within the body for bodily use.

Not only must provision be made for supplying the body

with the proper amount of food, but attention must be given to a proper supply of oxygen for the lungs. This seems a very simple thing to do, and it is simple under natural conditions, but when we consider the unnatural conditions that have been created by man and under which the human race in civilized countries is living, it becomes a problem that requires great engineering skill. The ventilation of great buildings, streets and subways is no small problem and yet if the processes of metabolism are to be maintained in the body ventilation must be given attention.

Importance of Environment

If these internal processes are to be maintained there must also be a certain environmental condition which will enable Innate Intelligence to bring them about. The temperature, humidity, and atmospheric pressure are all important in their proper relationship. Innate Intelligence is capable of adapting the body to extremes in these different environmental conditions, but the transition from one degree to another, such as temperature, must take place gradually to allow sufficient time for the adaptative changes.

It will be observed that these changes take place more or less gradually in Nature, but man is inclined to pass from one extreme into another without thought of time needed for adaptation. For example he passes from a highly heated room into one with a very low temperature, or comes from compressed air chambers, where the air pressure is greater than the normal, into the normal atmospheric pressure without sufficient precaution to the sudden change. These sudden changes not only draw very heavily upon the adaptative forces of the body, but actually interfere with the normal functional activity of Innate Intelligence and produce subluxations. The more natural the environment, the less energy will be required to bring about adaptation and maintain the equilibrium of the functions. Even though the environment is perfect, there must

be a current of mental impulses sufficient to produce adaptative action. When there is an interference with the transmission of mental impulses to such an extent that this adaptation can not take place there will be lack of function.

An environmental condition that will require as little adaptative energy as possible should be maintained. There should, therefore, be some attention given to the sick room, not that the hygienic and sanitary measures will in any sense cure the dis-ease, but that the forces in the body may not be used up and dissipated because of an environment that requires an abundance of force for adaptation.

The patient's weakness in many incoördinations is purely adaptative on the part of Innate Intelligence to prevent the patient from continuing at work or doing other things that would require an expenditure of the adaptative energies of the body. In other words, it is for the purpose of conserving the energies that are needed in the reparatory and restorative processes necessary to bring about coördination.

For the above reason it is necessary to give attention to the sick room in maintaining a condition to which Innate may easily bring about intellectual adaptation and not draw upon the reserve carrying capacity of the nerves.

Function of the Educated Mind

The expression of Innate Intelligence through the educated brain has functions to perform that are quite as essential and important in their way as are the functions produced by the expression of Innate Intelligence through the innate brain. Here is an illustration of what is meant: Innate Intelligence sends mental impulses to the liver and produces bile independent of educated brain. But if a man is walking across the street and falls to the ground unconscious he will be mutilated by traffic unless some one picks him up and protects him. Innate is still in the body of the unconscious man, but is not being expressed through the educated brain. The Innate is

powerless to protect that body from harm—it requires the expression of an Innate Intelligence through the educated brain of some other person to bring about an adaptation to circumstances and protect the unconscious man. In this case the educated mind of one individual is substituted for that of the other and the desired end is accomplished. This educated function could not be expressed in the unconscious man because of the inability of Innate Intelligence to be functioning through the educated brain.

The functions of the educated mind as pertaining to the expression of life in the body have to do mostly with the environment. It is, therefore, within the scope of Chiropractic to study the environmental conditions in order that the best interests of Innate Intelligence in the expression of life in the body be protected.

Need for Conserving Energy

Reference has already been made to the fact that adaptation to environment requires an expenditure of energy in case of incoördination. When an individual is sick there is need for conservation of energy to the fullest degree. At this time there must be no unnecessary drain upon the body in order that all forces may be centered upon the one thing—restoration. This leads us to a consideration of removing every unnecessary demand upon Innate for expenditure of energy so that all the forces may be utilized in the process of restoration.

There are a number of points to be considered in the care of the sick room where the patient is confined to his bed. There should be an even temperature maintained at all times and great care taken that the room is never overheated. The degrees at which temperature is to be maintained will be governed somewhat by the character of the incoördination. In conditions involving the respiratory tract the room may be

kept quite cold. The temperature of the sick room may vary from 50° F. to 70° F. according to the incoördination.

One of the most important features in the sick room is proper ventilation and the elimination of dust and odors. The patient at all times should be provided with an abundant supply of pure air free from dust and other impurities. The room should be so ventilated as to eliminate objectionable drafts. This may be accomplished by placing screens in front of open windows or stretching a gauze over the opening in the window which will admit the air but not rapid enough to produce a draft.

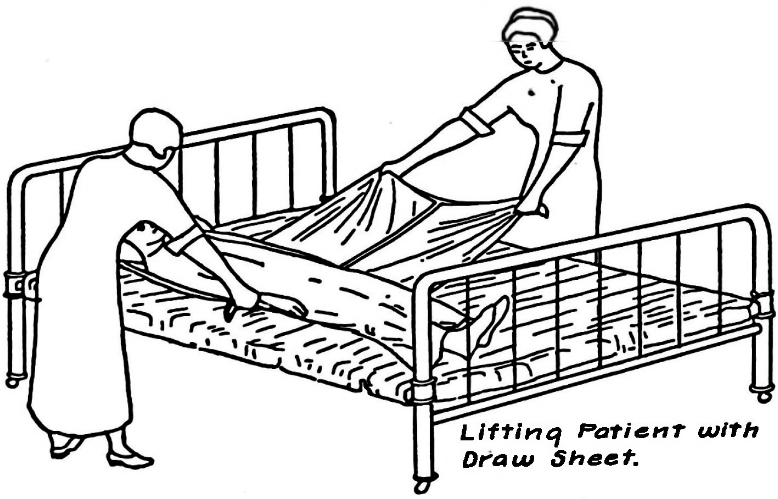
Changing Sheets.

In some cases of incoördinations involving the eyes it is advisable to maintain a subdued light in the room. This may be obtained during the day by drawing the shade part way down and during the night by placing shades over the lamps or electric lights. If the eyes are very sensitive to light an unnecessary adaptation may thus be avoided, thus enabling Innate to use her forces in a more desirable way.

In severe cases some attention should be given to the furniture and hangings, not so much because of any special benefit to the patient, but for the convenience of the attendants and to insure a better sanitary condition by eliminating every-

thing that would tend to catch dust and dirt and matter given off into the breathing zone.

The bed and bedding should be kept clean and fresh. The patient should be placed between sheets and not between blankets even in the winter time. The top cover on the bed should be white or of a light color. All soiled linen should be removed immediately and the pillows should be kept well aired. If the patient is weak, or for other reasons must be handled by attendants, a draw sheet will be a great convenience; a sheet may be folded about three times for this

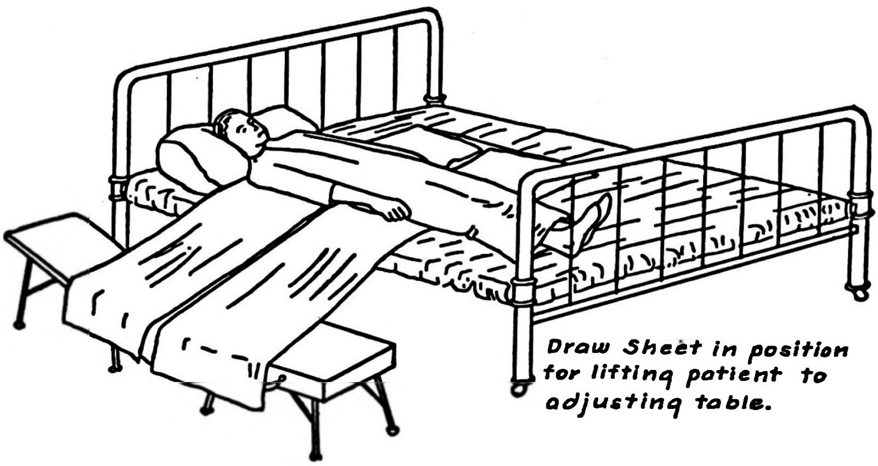


Lifting Patient with Draw Sheet.

purpose and placed under the patient's hips on top of the bed sheet. This may be used to turn the patient, move the patient from one side of the bed to the other, or it may be found of service in placing him on the adjusting bench. This draw sheet may be left under the patient without discomfort. At all times care should be exercised that the sheet, draw sheet and covers are kept free from wrinkles. The bed clothes should be changed in such a way as to disturb the patient as little as possible. One-half of the bed should be changed at a time and the patient moved over on the clean sheet with

the aid of the draw sheet. It is not expected that the chiropractor will find it necessary to do all these things himself; indeed, if the patient is ill enough to require this kind of care there should be a nurse on the case. However, even though he is not going to do these things himself, he certainly ought to know how they should be done.

If the patient is forced to use a bed pan, great care should be exercised that the bed clothes and clothing of the patient are not soiled. If they are they should be immediately changed

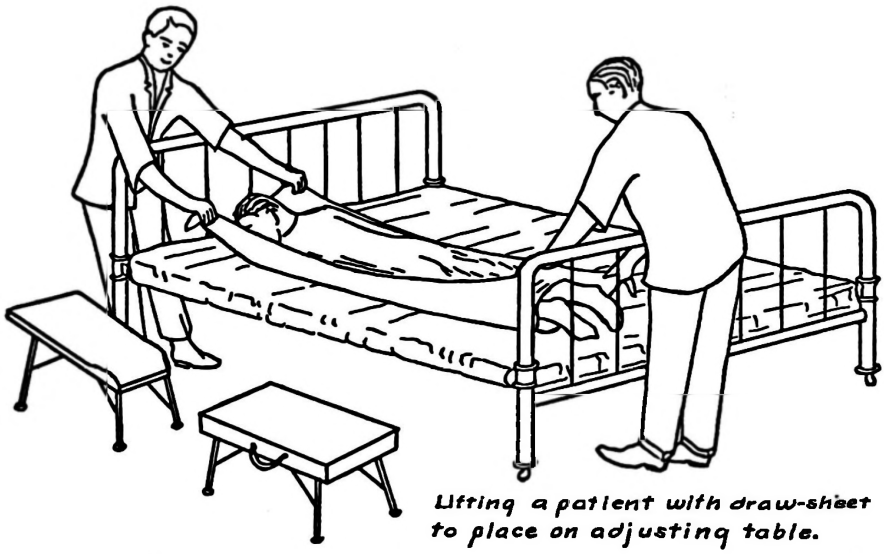


Draw Sheet in position for lifting patient to adjusting table.

or at least as soon as practicable. The disposal of the excreta is of vital importance. It should be removed from the sick room immediately. From a hygienic standpoint the fecal matter, urine and sputum should be disinfected with a 10% solution of formalin and allowed to stand for an hour, or by adding bichloride to make a solution of one to one thousand. The fecal matter should be placed in a receptacle and enough hot water added to cover it, then a cup of unslacked lime added and this allowed to stand covered for a couple of hours before throwing into the sewer.

The patient confined to the bed should receive proper care.

His hands and face should be bathed and he should be given a sponge bath. This may be done without disturbing the patient materially and may add greatly to his comfort. If the incoördination is in the fever family there will be no danger of the patient taking cold, but if it is not a febrile dis-ease, great care must be taken to prevent this complication. Everything possible should be done to add to the comfort



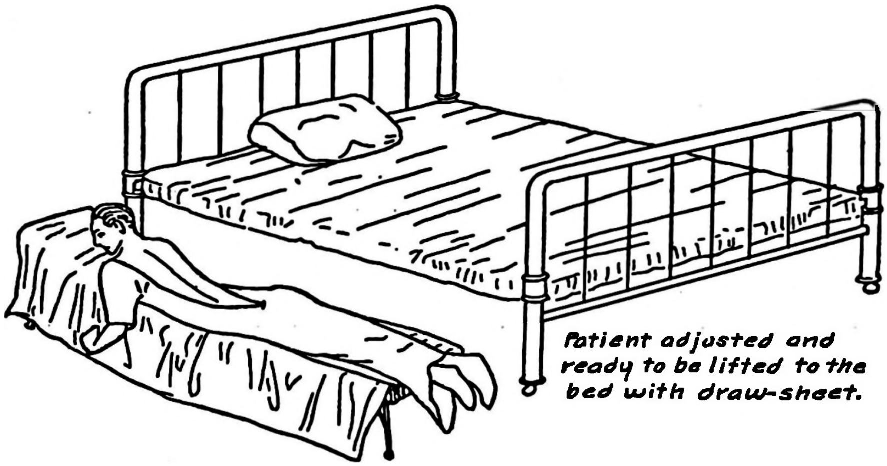
Lifting a patient with draw-sheet to place on adjusting table.

of the patient and to create a pleasant and cheerful atmosphere about the sick room.

Hygienic Measures Used in So-called Communicable Dis-eases

In discussing hygienic measures to be used in so-called communicable dis-eases, it must be understood that these measures are in no sense considered to be curative. If subluxations were adjusted as soon as produced there would be no occasion for such considerations, for man would remain immune and there would be no communicable dis-eases. Since

subluxations are not always adjusted as soon as produced, but remain and become chronic and dis-ease is allowed to gather great momentum before adjustments are given, it becomes necessary to bring about an adaptation educationally to the incoördination. During the course of the dis-ease certain hygienic measures should be used in order to maintain a proper environmental condition.



Patient adjusted and ready to be lifted to the bed with draw-sheet.

The so-called communicable dis-eases are quarantinable and should be reported to the proper health authorities in the states requiring such procedure, in compliance with the law. There are certain sanitary and hygienic measures that should be used from a standpoint of pure cleanliness and common decency. The hygienic measures ordinarily recommended may be summed up as follows: The stools, urine, sputum and other excretions should be thoroughly disinfected. The urine may be disinfected by adding bichloride to make a solution of one to one thousand or by adding 10% formalin and allowing the solution to stand for an hour or so. It is more difficult to disinfect fecal matter. The masses should be thoroughly broken up and disinfected with bleaching powder, 3%. A 5%

solution of carbolic acid may be used or formalin 10%. Another easy and effective way is to add enough hot water to cover the entire stool and then add a cup of unslacked lime or about one-fourth as much lime as bulk. The receptacle should then be covered and allow to stand for a couple of hours. In this way there will be enough heat generated by the lime to destroy the microörganisms. The sputum should be burned.

It is recommended that the bed linen, towels and handkerchiefs used by the patient be disinfected by immersing for at least an hour in a solution of bichloride of mercury, one to one thousand, a 5% solution of carbolic acid, or 10% solution of formalin.

Chiropractic Cause of So-called Communicable Dis-eases

Chiropractically the cause of the so-called communicable dis-eases is interference with the transmission of mental impulses, which results in lack of function. Where there is an interference with the functions resulting in abnormal metabolism there is always an accumulation of waste products and poisons. The accumulation of the waste products and the correspondingly lowered resistance in these structures provide a fertile field for the growth and development of the bacteria that are found in the particular incoördination. These germs are present as scavengers for the sole purpose of consuming the waste material and these bacteria will disappear as soon as the subluxated vertebræ are adjusted and the tissues become normal, for they can not live on normal tissue and will be excreted as waste. However, if there are subluxations which interfere with the transmission of mental impulses resulting in lack of functions in the body and microörganisms are allowed to enter the body, the abnormal tissues will furnish them with food and a proper culture medium in which to develop. From a chiropractic standpoint the best prophylaxis

is adjustments to restore transmission to normal and the germs will find no food or fertile field in which to develop and will be excreted as so much material that can not be used in the metabolism of the body.

Under chiropractic adjustments the incoördination (so-called contagious dis-ease) will not run its full course; as a matter of fact, the recovery may be so rapid that the patient will be sick only a very few days. Under adjustments there will be no complications or sequelæ and for this reason there is not the necessity for hygienic measures to the same extent as under ordinary treatment, but during the time the patient is sick hygienic measures should be observed.

CHAPTER XV
FOOD

FOOD

GENERAL CONSIDERATIONS

Necessity for Food

- DEFINITION OF FOOD
- TRANSFORMATION INTO BODY TISSUE

Distinction between Appetite and Hunger

- APPETITE DIRECTED BY EDUCATION
- HUNGER DIRECTED BY INNATE
- OVEREATING
- SYMPTOMS OF OVEREATING

Starvation

- DEFINITION
- SENSATION OF HUNGER

Inanition

- DEFINITION
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CHAPTER XV

FOOD

GENERAL CONSIDERATIONS

Necessity for Food

Food is defined as nutritive material absorbed or taken into the body of an organism for purposes of growth or repair and for the maintenance of the vital processes. Food is derived from two sources—the animal kingdom and the vegetable kingdom.

The body is composed of materials which are constantly wearing out under the processes carried on in the functioning of the body, and this tissue must be replaced with new material. This is supplied in the form of food that is taken into the system and acted upon by the secretions in such a way as to break up and properly combine the chemicals so that Innate Intelligence may bring about an assimilation in the tissue cells.

The variety of articles that Innate can use as food in the body is varied. It is not necessary to have a perfect food or a perfectly rationed diet in order for Innate to maintain the anabolism of the body. The ease with which the processes of digestion are carried on depends upon the freedom with which mental impulses are transmitted to the organs of digestion.

As there is a constant flow of mental impulses through the nerves and a constant expression in the tissue cells so there is a corresponding change taking place in the tissues of the body. To this change there must be a constant adaptation so that new tissue will be provided to replace that which is worn out. To accomplish this there must be a proper supply of nutrition at properly stated intervals.

It is not the purpose of chiropractic hygiene to say what a person should or should not eat. Innate Intelligence is the best judge as to that. Chiropractic philosophy teaches that a person may eat anything that does not disagree with him; or to put it otherwise, a person should eat what agrees with him. It also teaches us that pain and discomfort from eating that which does not digest is Innate telling the educated mind that this particular article is not being digested and that he should not eat it. This lack of digestion is not the fault of the food, but is due to an interference with transmission which prevents Innate from bringing about an adaptation to this food. In other words, the interference with transmission prevents Innate from producing the secretion that is needed in the digestion of this particular article or diet.

Distinction between Appetite and Hunger

It is quite necessary that we make a distinction between appetite and hunger. Hunger is Innate calling for food. It is the expression through the educated brain of the vibratory interpretations which are received from the tissue cells that are in need of nutrition. These vibrations are interpreted by Innate Intelligence and Innate becomes aware of the need of the tissue cell. Thereupon she expresses this interpretation through the educated brain and we become aware, educationally, of this condition which is interpreted as hunger.

Hunger is an Innate interpretation while appetite is an educated interpretation. Hunger is a desire for food while appetite is a desire for a certain kind of food. The appetite decides what kind of food we will eat to satisfy the hunger. Appetite may be perverted.

When there is a condition which interferes with the process of digestion Innate Intelligence takes away the desire for food. When this is true there should be no effort on the part of the educated man to tempt the appetite. If the appetite is tempted in such a case, the food will not be properly

digested, or if it is, it will be necessary for Innate to employ force that should be used for some other purpose.

If the processes of digestion are normal the individual may eat any article of food and it will be properly digested and he will not be conscious of this process. But if the process of digestion is abnormal he may not be able to digest even the most scientific diet. The severity of the indigestion will depend upon the degree of interference with function. In such event appetite is not reliable because it may call for something that can not be digested. Innate knows nothing of the different foods. She calls for nutrition, but the educated mind says beefsteak and eggs. Now if we become sick after eating beefsteak and eggs this is Innate trying to let us know that the food is not being digested and should not be taken into the stomach.

On the other hand we may find that Innate will revolt when we try to eat food which can not be digested. Innate will cause us to lose our desire to eat such food, the very thoughts of it being repulsive.

Chiropractic philosophy maintains that a patient should eat anything that agrees with him and that Innate is the best judge. A food is anything that can be used in the metabolism of the body. A poison is anything that can not be used in the metabolism of the body and if allowed to remain in the body will injure the tissues. That which is food for one may therefore be poison for another.

If there was no interference with the transmission preventing the normal expression of Innate Intelligence through the educated brain, we would eat only those things which could be digested. It might be said that Innate is a great dietitian and one that would never make a mistake if there could always be a perfect expression. The trouble is that we substitute educated for Innate and therefore make mistakes and eat those things which can not be digested because of interference with transmission of mental impulses.

The amount of food and the kind required by man will be governed largely by the character of the work he does. The state of health, the climate and season, occupation, clothing, exercise, body weight, sex and age all have an influence on the quantity of food required to maintain bodily health.

The appetite could be relied upon to determine just the quantity and quality of our diet were it not for the fact that, in this day of civilization when cooking is a fine art and the appetite is so stimulated, we eat beyond the normal requirements of the body. As a result the stomach is overloaded with food that is not required for the normal health and vigor of the individual. The digestive organs are overworked. There is an engorgment of the liver, and degenerative changes, such as fatty heart, take place.

The symptoms of overeating are: headache, feeling of lassitude, drowsiness, mental stupor, the liver becomes congested, the intestines are engorged, the secretions of the body are altered in their composition, the urine is heavily loaded with salts, there is constipation, maybe biliousness, and the tongue is heavily coated. There may also be obesity and gout.

Starvation

Food must be taken into the body in sufficient quantity and quality so that bodily function may be maintained. The term starvation is a technical one meaning a lack of sufficient food, although it is used loosely to mean a condition resulting from lack of assimilation. After the food in the stomach has been completely digested and the process of assimilation has reached a certain stage, vibrations are carried from the tissue cells to the brain. These enable the intelligence to know in what stage of assimilation the food is, and these vibrations are interpreted as hunger, the sensation being localized in the stomach. In the normal individual this sensation will appear soon enough to enable the introduction of food into the stomach so that its digestion may be completed before any

injury from lack of nutrition occurs to the tissues. In other words, a provision has been made whereby food will be called for in sufficient time to enable Innate Intelligence to prepare this food for the tissue cells, so that there will be a new supply as soon as the process of assimilation has been completed. If food is not taken into the stomach when the sensation of hunger is manifested this sensation in the course of time will result in extreme bodily weakness and faintness. In certain incoördinations sensations may be produced which will be interpreted by the educated mind as hunger. Therefore, it is necessary to make a distinction between the sensations of hunger and the sensations from incoördinations of the stomach. In a dyspeptic condition there is an almost constant sensation of hunger, and the individual may eat much more food than can be digested. Very often, in these cases, the food is taken into the stomach so rapidly that there is not sufficient time for the gastric secretions to act upon it. In this way much more food may be taken into the stomach than is actually required by the tissue cells. It is obvious that we must have a proper amount of food in balanced rations, and also that this food be properly digested in order to be assimilated by the tissues. If food is not properly digested it can not be assimilated.

Inanition

There may be a condition obtained in the body resulting from a lack of assimilation of food by the tissues, even though there is a sufficient amount of food taken into the body. This condition is known technically as inanition. Death will result in a short time when food is completely withheld whether the condition is that of starvation or inanition. There may be an interference with transmission of mental impulses to the digestive organs. This will interfere with digestion, and inanition will result because the food which is not properly digested can not be assimilated even though the tissue cells are per-

fectly normal. Inanition may also result from an interference with transmission, which prevents the tissue cells from performing their normal function in the process of assimilation. In this way the tissues starve for the want of food, not because there is a lack of nutrition in the body, but because the food taken into the system has not been properly broken down by the digestive secretions, or if it has been properly digested it has not been assimilated. It is a recognized fact that a large percentage of growing children are underweight. Authors differ as to the percentage. It ranges all the way from 15% to 60%. This condition is not necessarily caused by an insufficient amount of proper food, for the condition has been found more prevalent among the children of the wealthy than among those of the poorer classes. This shows that the cause for such malnutrition is within the child and not in the food that he is eating. In the large majority of cases it is either because the food is not being properly digested or is not being assimilated after it has been digested. It is quite necessary that there be a properly balanced diet, but even a perfectly balanced diet will not guarantee perfect assimilation. This can be accomplished only through unhindered transmission and expression of mental impulses in all parts of the body.

Balanced Rations

Properly balanced rations will enable Innate Intelligence to promote the growth and maintain the processes of the body with the greatest ease and the least necessity for the adaptative expenditure of internal energy. Much attention has been given the science of nutrition. At one time there was great importance attached to the chemical composition of foods, special attention being given to the proteins, carbohydrates and fats contained in the diet. Later it was thought that certain inorganic salts were necessary. Great stress has been placed upon the caloric value of food. The latest students

in the science of nutrition have emphasized the value of vitamins.

A properly balanced diet should contain sufficient calories and inorganic salts, especially iron, phosphorus, calcium and iodin. There should be a sufficient variety of foods to provide the necessary vitamins. It is also thought that a certain amount of roughage is necessary. If we expect the best results from our digestive tract we should strive to keep the balance approximately the same each day. This is not because Innate Intelligence is unable to adapt the body to a great variety of food, but it is more to prevent a necessity for such extreme adaptation. To illustrate: If we constantly introduce too much acid into the stomach, it necessitates an adaptative action on the part of Innate Intelligence in the production of an alkali to neutralize the acid. Since we know so little educationally about nutrition, it is wise for us to eat as great a variety of foods as possible, and especially is this necessary in providing a balanced ration for growing children.

In considering food we must not forget the importance of proper digestion and assimilation. In Chiropractic the diet is of little importance, providing the functional activities of the body are maintained at normality.

CLASSIFICATION OF FOODS

Sources of Food

Foods are classified according to source, chemical composition, physical properties and function.

In classifying food as to its source we have three classifications: animal, plant and mineral. Meat, fowl, fish, shell-fish, eggs, milk and its products, animal fat and gelatin help to constitute the animal foods. Seeds, roots, leaves, cereals, vegetables, fruits, sugar and vegetable oils are plant foods. From the mineral there are: iron, potassium, phosphorus, iodin, sulphur. These are obtained from the animal and plant

foods. Water is not classed as a food, but it enters into the diet as a very important constituent.

Chemical Composition

From the standpoint of chemical composition foods are grouped into two classes, nitrogenous and non-nitrogenous. Both the animal and vegetable kingdom contribute foods to each of these classes, although the animal substances belong more to the nitrogenous, while the vegetable kingdom belongs more particularly to the non-nitrogenous foods. The nitrogenous foods consist chiefly of carbon, oxygen, hydrogen and nitrogen and are considered to be essentially tissue builders. Hygienists speak of the non-nitrogenous foods as being force producers, asserting that these foods supply energy for muscular action.

Physical Properties

Under this heading foods are classified as: (a) solids, semi-solids and liquid foods; (b) fibrous, gelatinous, starchy, oleaginous, crystalline and albuminous foods. The indigestible residue is called roughage.

Function

Foods are classified as: Proteins, carbohydrates, fats, condiments, inorganic salts and vitamins.

Proteins are the tissue builders of the body. They are derived from meat, milk, eggs, peas and beans for example. Some foods are much richer in protein than others, and there is also a difference in the quality of the protein. Some protein is more valuable from the standpoint of food than others. Casein is very rich in protein which is of great food value. The protein found in meat is also of good quality, but it is not as valuable as that found in milk. Such cellular organs as the liver and pancreas furnish a good source of protein. There is a very small amount of protein of excellent quality found in leafy plants. There is a difference of opinion among authors

as to the amount of protein needed per day by healthy individuals. Some advise a very small amount of protein while others recommend a diet containing as much as 125 grams, approximately four and one-half ounces, per day.

The carbohydrates furnish the body with the necessary material for forming adipose tissue and heat through oxidation. It is very essential that the body be provided with sufficient starches. This is evidenced by the fact that starch constituents are so universally found in food from whatever source taken. For example, carbohydrates or starchy foods are found in cereals, tubers, such as potatoes, and sugars of cane, beets and fruits, and glycogen in flesh.

Fats come from animal and vegetable sources and are represented by butter, fats of meat, olive oil, cottonseed oil, nuts and seeds. Oily substances are found in practically all vegetables. A vitamin known as fat soluble A is found in certain fats, but not in others. It is found in the fat of milk and usually in other fats of animal origin; and also in eggs and in leafy plants. Lard and oil of plant origin furnish very little of this vitamin. It can readily be seen by this that all fats do not have the same food value.

The condiments are the spices such as pepper, mustard, cloves, coffee, tea and alcoholic beverages.

Inorganic salts are not ordinarily classed as a food. However, it is essential in the maintaining of life. It performs a very important function in the building of bone and assists also in digestion and metabolism. The vegetable acids, such as tartaric from grapes, lemon and citric, will be found in combination with the bases calcium, sodium and potassium, for example, especially when they are taken from fresh vegetables and fruits. When absorbed they form carbonates and are therefore indispensable in the process of metabolism, since they aid in maintaining the alkalinity of the body. If the food of the growing infant is deficient in calcium phosphate, or if there is an interference with transmission which hinders the

activity of calcium phosphate in the body, the bones of the child will be poorly developed and will become abnormally soft. In this case they yield under the weight of the body and become deformed. A good illustration of this is seen in rickets.

Milk forms an excellent source of calcium in large quantities and in a utilizable form. The fact that milk is deficient in iron must be taken into consideration when it is used as a sole article of diet for growing children.

Vitamin is the name given to a chemical substance found in yeast and in rice polishings. It was so named by Dr. Casimir Funk, a Russian chemist, in 1913. The chemical nature of the vitamin is unknown, but it has been proven that it possesses great growth-producing qualities, a small amount producing great results. Only three vitamins have been recognized. One is soluble in fat and has been called fat soluble A, the other two are soluble in water and are known as water soluble B and water soluble C.

Fat soluble A is found in the leaves of plants, spinach, carrots, peas, peanuts, but more abundantly in eggs, butter and milk; it is also present in such glandular organs as the liver and kidneys. Cod liver oil is found to contain this vitamin. It is found to be almost, if not entirely, missing from lard and the fats of vegetable origin; sugar from cane, milk and beets, bolted flour, starch and glucose and polished rice are entirely devoid of this vitamin, while the rice polishings are exceedingly rich in fat soluble A.

Experiments have been made upon rats and dogs which show that if they are fed upon a diet devoid of this vitamin they develop a condition similar to rickets. Their eyes become inflamed and dry and eventually blindness results.

The vitamin known as water soluble B is probably the most widely distributed of the vitamins. It is obtained in tubers, seeds, leaves of plants and in animals, but not in the oils or fats of either vegetable or animal origin. This vitamin

promotes growth. The prolonged absence of it induces beri-beri. Water soluble B is not destroyed by boiling the foods in which it is found. This vitamin is found in yeast, navy and soy beans, milk, parsnips, potatoes, spinach, whole grain, rice, maize, carrots, onions, oats, cauliflower, celery, rutabagas and whole wheat bread. This vitamin is present in very small quantities in such foods as cabbage, tomatoes, peas, eggs and wheat bran. All ordinary foods contain this vitamin. Water soluble B is known as the antineurotic vitamin.

The water soluble C vitamin is known as the antiscorbutic vitamin. In experimentations it has been found that animals entirely deprived of this vitamin have developed scurvy. The condition disappeared when the vitamin was included in the diet.

The experiments by which it has been hoped to associate many dis-eases with vitamins have not proven satisfactory, and while it is a recognized fact that they play an important part in the bodily metabolism yet dis-ease can not be corrected by a scientific endeavor to supply the needed vitamins through diet.

Water soluble C is found in such foods as: apples, cabbage, tomatoes, spinach, peas, onions, lettuce, oranges, potatoes and milk.

CHAPTER XVI
FOOD POISONS

FOOD POISONS

Source

FORMATION PERIOD
SYMPTOMS

Food Infection

INCUBATION PERIOD
SYMPTOMS
MORTALITY RATE

Food Intoxication

BOTULISM
SOURCE
PERIOD OF INCUBATION
SYMPTOMS
MORTALITY RATE

Adulteration of Food

MEANS OF
MOST COMMON ADULTERATIONS

CHAPTER XVI

FOOD POISONS

Sources

In most instances such poisoning comes from food that is preserved in some way. Very seldom do we find this poisoning in fresh foods. Such prepared foods as chopped meats, sausage, meat pies and salads, for example furnish the best sources for this poisoning. The formation period of the poison usually covers from eight to twenty-eight hours. There are two classes of food poisoning: first, food infection; second, food intoxication. Clinically, there is a great difference between them. Food infection is an acute condition in which there is nausea, vomiting, cramps, diarrhœa and fever. Food intoxication is a febrile condition characterized by nervous symptoms, paralysis and constipation.

In food infection the mortality is seldom above 1%, while in food intoxication it runs from 50% upward. The condition resulting from food intoxication is known as botulism. The statistics which are available on food poisoning would indicate that it is not very prevalent and the number of persons involved in outbreaks is comparatively small.

Many conditions in which there are gastro-intestinal symptoms might be mistaken for food poisoning. Such symptoms as nausea, cramps, vomiting or diarrhœa may be due to acute gastric indigestion, and may not be in any way associated with food poisoning.

Foods containing such poison should be thoroughly cooked so that the heat may penetrate to the very center. A temperature of 70° C. is sufficient to render the food free of the poison.

Food Infection

The incubation period of food infection is usually from six to twelve hours from the time the food is taken into the stomach until the manifestation of symptoms. This period may in some cases be reduced to only four hours, while in others it may be extended to seventy-two or more hours. This class of food poisoning is sometimes called meat poisoning from the fact that meat forms its chief vehicle, but milk and milk products and even vegetables may contain it.

The symptoms are characterized by acute gastro-intestinal disturbances. The onset is usually sudden. The first to appear are severe griping pains in the abdominal region, there may be various nervous manifestations, such as drowsiness, muscular twitchings and more or less restlessness. The abdominal pains may be accompanied with diarrhœa, nausea and vomiting. There may be chills and headache. As the condition progresses the stools become a greenish color and of a very watery consistency. There may be chills and headaches, marked muscular weakness, faintness and possibly prostration. The temperature runs from 102° F. to 103° F. There is excessive thirst, skin eruptions and herpes. There is often oliguria. The severity of the symptoms will depend upon the amount of poison taken into the system and the freedom of transmission of mental impulses, which will enable Innate Intelligence to bring about her adaptative processes. Usually the attack lasts only a few days, although the fulminating cases may prove fatal within twenty-four hours. Warm weather seems to be conducive to the formation of this poison, since the greater number of outbreaks occur in the summer time.

Food Intoxication

This form of food poisoning is called botulism. The poison which forms is the specific toxin produced by the activity of the bacillus botulinus. The botulis itself lives on decayed

organic matter, therefore it is of the saprophyte type. This poison is found in a great many different foods of both plant and animal origin. The intoxication in botulism affects the central nervous system. It is a febrile condition and there are no gastro-intestinal disturbances. Usually the symptoms in botulism will appear from eighteen to thirty-six hours after the poison has been taken into the stomach. There are cases on record in which the symptoms have appeared within four hours. The period of incubation depends upon the amount of toxin ingested and the ability of Innate Intelligence to adapt the body to the poison.

The symptoms usually begin with headache and dizziness, feeling of fatigue and muscular weakness. One of the early symptoms is a disturbance of vision which may progress until the patient is blind. Both the extrinsic and intrinsic muscles of the eye become involved. There is blepharoptosis and the pupils become dilated. There is diplopia and the loss of adaptative response of the eye to the light. There is soon complete loss of accommodation, opthalmoplegia, nystagmus, strabismus and in some cases photophobia.

Concurrent with the beginning of the disturbances of vision there is difficulty in swallowing and talking, with a feeling of throat contraction. There may be frequent attacks of strangling, with extreme dryness of the mouth and throat, which result in a cough. Stubborn constipation results from lack of peristalsis. Beginning in the intestines and passing gradually upward there is progressive, ascending paralysis. The lack of proper nervous tone is evidenced by fatigue, drowsiness, headache and unsteadiness in walking which may result in a steppage gait, there is great muscular weakness and incontinence of urine. Other prominent symptoms are an insufficient secretion of saliva, sweat and tears and a deficiency in the excretion of urine. This results in a typical "dry man" condition. Later in the course of the disease the temperature is subnormal and the pulse rapid. There may be paralysis of

the laryngeal and pharyngeal muscles, which results in an inability to swallow. There may be complete aphonia. The case is very likely to develop broncho-pneumonia, in which event there will be temperature. The facial expression is that of great anxiety and utter helplessness. The sensation of strangling becomes more frequent and there is a struggle for breath, death eventually resulting. The duration of this disease varies greatly. Death may result in forty-eight hours after the poison has been ingested. Seldom will a condition run more than eight days. In cases that recover, convalescence is very slow. The patient may be many months recovering. The prognosis in botulism is considered very unfavorable, the mortality being as high as 100% in some outbreaks. The lowest mortality, according to statistics, is 37.5%.

Microscopic examination of the bodies which are the victims of botulism has revealed a great congestion of the central nervous system and also of the abdominal and thoracic viscera. Some have shown a great number of hemorrhages at the base of the brain and the upper portion of the spinal cord; the lungs are also congested. Originally it was supposed that food intoxication came only from sausage or other meat, but it has later been proven that this poison might develop not only in meat but in such food as string beans, cottage cheese, corn, asparagus, spinach and ripe olives. It has also been found in turkey, chicken and fish. Most cases of botulism result from the eating of foods that have received some preservative treatment; seldom will it be caused from the eating of fresh foods. Chiropractically this condition is in the poison family and would involve S.P. and K.P. as a major.

Adulteration of Food

Food adulteration may consist in:

1—Extraction of nutritive substances.

2—Addition of substances lowering the quality of the food.

3—Substituting inferior grades of food.
4—Fradulent labeling of food.
5—Changing the appearance of food by coloring or other methods which will conceal the inferior quality.
6—Adding injurious substances for the purpose of preserving the food.

The Pure Food Act of 1906 makes the following classification in a statement of the methods which are considered in the adulteration of foods:

1—"If any substance has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength.
2—"If any substance has been substituted, wholly or in part, for the article.
3—"If any valuable constituent or article has been, wholly or in part, abstracted.
4—"If it is mixed, colored, powdered, coated or stained in any manner whereby damage or inferiority is concealed.
5—"If it contains any poisons or other added deleterious ingredient, which may render such articles injurious to health.
6—"If it consists in whole or in part of a filthy, decomposed or putrid animal or vegetable substance, or any portion of an animal unfit for food, whether manufactured or not, or if it is the product of a diseased animal or one that has died otherwise than by slaughter."

Rosenau gives the following as the most common adulterations:

"Cottonseed oil is sold as olive oil; honey may contain glucose; cocoa and chocolate are frequently mixed with both starch and sugar; coffee is extensively adulterated with caramel, pea-meal, chickory and saccharose

extracts; lard is mixed with cheaper fats or cotton seed oil; saccharin is substituted for cane sugar; cereals give bulk and weight to sausages; gypsum or bran is added to flour; barium sulphate to powdered sugar, flour to turmeric or corn-meal to mustard; oleomargarine is sold as butter; distilled and colored vinegar is sold as cider vinegar; ground spices are adulterated with cocoanut shells, rice, flour and ashes; water, sugar and tartaric sold as lemonade; wines and liquors are sometimes adulterated with alum; baryta, caustic lime, salicylic acid, wood alcohol and hematoxylin, terra alba, kaolin, and various pigments are sometimes added to candies; gum drops are largely made with petroleum paraffin products; much of the maple sugar formerly sold was made from glucose and coloring matter."

A good illustration of separating the nutritive substances is the extraction of cream from milk and certain elements from meat. There is really no objection to abstracting nutritive elements from food if afterward that food is properly labeled; there is no objection in taking cream out of milk and selling the skim milk, providing it is not sold for whole milk.

An illustration of lowering the quality of the food is the addition of water to milk, of bran to flour, of bariumsulphate to powdered sugar.

An illustration of substitution would be to substitute saccharine for sugar, oleomargarine for butter, cottonseed oil for olive oil.

CHAPTER XVII
MILK

MILK

COMPOSITION

Milk as a Food

Proteins

- CASEIN
- LACTALBUMIN
- LACTOGLOBULIN

Fat

- CREAM
- SKIM MILK
- BUTTER

Vitamins

- FAT SOLUBLE A
- WATER SOLUBLE B
- WATER SOLUBLE C

Lactose or Milk Sugar

- DEFINED
- LACTIC ACID

SANITARY MEASURES IN PRODUCTION

Milk, a Germ Medium

Care in the Milking

Care of the Cows

Barns and Barnyards

- FREE FROM MANURE
- GROUND WELL DRAINED
- STABLES PROPERLY VENTILATED

Bottling

- STRAINING
- IN SEPARATE MILK HOUSE

Proper Temperature

- NOT ABOVE 50° F. IN TRANSPORTATION
- STERILE MILK

PREPARATION OF MILK AND MILK PRODUCTS

Pasteurization of Milk

- DESTROYS SO-CALLED PATHOGENIC GERMS

- DOES NOT CHANGE DIGESTIBILITY
- FURNISHES PURIFIED MILK
- ARTIFICIAL PRESERVATIVES DANGEROUS

Condensed Milk

- SOME OF WATER REMOVED
- POOR IN VITAMIN C

Dry Milk

- IN POWDER FORM
- POOR IN VITAMIN C
- SUBSTITUTED FOR FRESH MILK

Butter

- CHURNING
- CONSTITUENTS
- OLEOMARGARINE

Cheese

- PROCESS
- NITROGENOUS SUBSTANCES

CHAPTER XVII

MILK

COMPOSITION OF MILK

Milk as a Food

Milk contains all the elements necessary in a balanced diet for the adult and furnishes an almost perfect food for the suckling. Milk is lacking in iron and roughage and is therefore not suitable for the sole diet of adults. This is compensated for in the infant by a large amount of iron which is contained in the spleen and furnishes this necessary element during the suckling period. There is no other single food that will so well promote the growth and development in young children. Milk is easily digested, is palatable, and forms one of our best and most important articles of food. It is asserted that the consumption of milk in the United States will average about 0.6 of a pint per capita per day. In many countries there is practically no milk used. In the United States about 16% of the dietary consists of milk and its products.

Milk is an animal secretion produced by the mammary gland and is exceedingly complex in its composition. It consists chiefly of water containing various solids in solution. Cow's milk consists of 87% water and 13% solids. The solids consist of fats in emulsion, milk sugar, albumin, casein and mineral matter. Milk also contains such gases as oxygen, nitrogen and carbon dioxide. It contains enzymes, phosphatids and vitamins, also antibodies and other substances.

Fresh normal milk is an opaque fluid of white or yellowish-white color and has a sweetish taste and rather pleasant odor. In reaction milk is amphoteric, that is, it is acid to litmus

and alkaline to turmeric. The specific gravity of cow's milk is from 1.027 to 1.035. Under the microscope it is found to contain fat globules and cells, also bacteria and other objects. The oxygen and nitrogen that are found in milk are thought to be carried into it mechanically from the air during the process of milking. Lecithin, cholestrin, citric acid, lactosin, orotic acid and ammonia are found in milk in small quantities.

Proteins

Casein, lactalbumin, and lactoglobulin are the three proteins found in milk and are usually constant in a given species.

Casein is found nowhere in nature except in the secretion of the mammary glands. It is highly specialized and, as a nucleoalbumin, contains a certain amount of phosphorus. Lactalbumin is a protein found in quantities varying from 0.2% to 0.8%. It is similar to the serum albumin in blood and coagulates at 70° C. There is a mere trace of lactoglobulin in milk. It is insoluble in water.

Fat

Milk contains fat in emulsion; that is, the fat is suspended in the serum of milk in the form of emulsion. The fat is lighter than the milk serum and therefore rises to the top in the form of cream, or the fat may be separated from the milk by centrifugal force. Cream does not consist in fat globules alone but contains the same constituents as the milk, only it is very much richer in fat. By agitating the cream, as in a churn, or by means of shaking, the fat globules will coalesce and form into lumps of butter. It is stated by some authors that cream contains a larger number of bacteria than skim milk. The fore milk, or that which is first milked from the udder, has a small amount of fat; the last that is taken, which is known as the strippings, may contain as much as 9% or 10% of fat. An increase in the temperature of the milk will retard the rising of the fat and if the temperature

is kept above 65° C. for any length of time, cream will not form on top. Therefore, it follows that a moderately low temperature will increase the rapidity with which fat rises to the top of the milk.

Parkes says, "Milk should not have less than 12.5% of total solids of which 3.5% is fat and 0.7% is salts; . . . . the percentage of cream by volume not less than 10%."

Infants placed on a diet of milk that is too rich in fats will thrive for a while, but in time will lose weight and show other symptoms, indicating the inability of Innate to digest the food. The stools become hard and dry, of a pale color and composed largely of fat soaps. This shows that Innate is unable to furnish sufficient alkaline bases through the body to saponify the excessive amount of fat in the intestines. This results in a condition resembling acidosis.

Vitamins

Milk is found to contain all three vitamins, A, B, and C, known as the fat-soluble A, water-soluble B, and water-soluble C. Cream is rich in vitamin A. This vitamin increases growth and promotes nutrition and is therefore valuable in the diet of the young. Vitamin A and B are not destroyed by heat, unless it be a very great degree for a long period of time; they also resist drying and age. For this latter reason milk may be used in cooking and still retain the virtues of these two vitamins, as well as do evaporated milk and dried milk. Vitamin C is impaired and may be completely destroyed by high temperature and deteriorates with age and with drying. There is no article of food (diet) that is superior to milk in dietetic and nutritional value, and especially is this true of butter fat. The standard by which milk is tested is the amount of butter fat it contains.

Lactose or Milk Sugar

Milk contains what is known as milk sugar or lactose. It is white crystalline sugar, has a slightly sweet taste and is

soluble in water. When acted upon by microörganisms it is changed into glucose, and the glucose is then reduced to lactic acid, the lactic acid being the cause of the milk souring. Milk sugar is found nowhere else in Nature.

SANITARY MEASURES IN PRODUCTION

Milk, a Germ Medium

Milk, because of its characteristic qualities, forms a medium in which all kinds of bacteria and germs, or low forms of life, thrive. When we consider the processes necessary to obtain the milk and deliver it to the consumer, even though the most rigid sanitary methods are observed, it can readily be seen that milk is exposed to almost all kinds of dirt and to the different forms of organisms.

It is very difficult to obtain milk in a state of purity and if germs played as important a part in the production of disease as is thought by some, one of the most important articles of diet would be lost to mankind. Great quantities of these germs are ingested into the stomach of individuals who drink milk.

These bacteria are carried into the milk during milking and in the handling of the milk and the retainers. Bacteriological standards have been established, but vary a little with different authors. Usually it is agreed that certified milk should not contain more than 10,000 bacteria per cubic centimeter. Market milk should not have more than 1,000,000 bacteria per cubic centimeter in the raw state and not more than 50,000 per cubic centimeter after pasteurization.

It can be seen by this standard that even the relatively pure milk contains great numbers of bacteria and yet these bacteria are ingested into the digestive tract and no harm done. As a matter of fact, this helps to substantiate the contention of Chiropractic that these germs and the different bacteria are

essential to life. There is no question, however, that poisons may be contained in milk, and when these are taken into the stomach Innate may not be able to properly adapt the tissues and thus a toxic condition will be produced.

Because of the characteristic qualities of milk, the strictest sanitary measures should be observed in all the processes involved, from the time the milk is taken from the cow until it is delivered to the customer.

Milk undergoes certain physical, chemical and biological changes as soon as it is taken from the cow: the cream rises and thus it is separated from the milk; there is also a separation of the solids from the fluids.

Care in the Milking

A sanitary environment should be provided for the cows and special care should be taken in the process of milking to prevent the milk from becoming contaminated with dirt and filth. Those who handle this milk should take proper precautions to prevent dirt from getting into it. All utensils should be kept clean, sweet and free from sour milk.

Sanitary measures should include: Proper care and feeding, or the health of the milch cows; (2) proper regulation of the bottling and transportation of the milk. The cows should by all means be healthy, inasmuch as milk is an animal secretion. It is certain that if the animal is suffering from dis-ease, this secretion will not be normal. Over-exertion and fright will also affect the milk. Care must be exercised to detect dis-ease and such dis-eased animals should be separated from the herd and their milk not used.

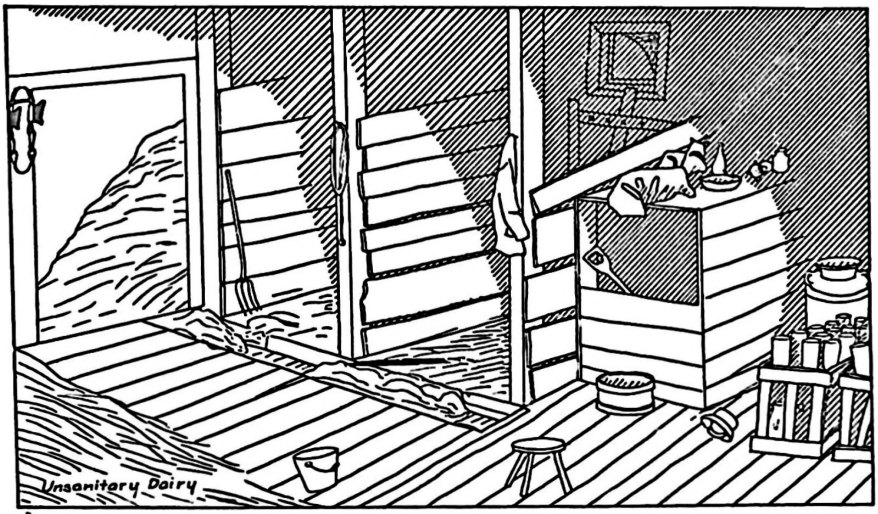
Care of the Cows

The cows should have plenty of exercise, but care should be taken that they are not frightened or over-exerted. They should be provided with proper protection from the weather

and should have plenty of fresh hay, ground whole grain, and, when possible, be allowed to graze. Spoiled vegetables or fruits, foul or fermented foods are detrimental to dairy cows. A proper supply of salt is necessary and plenty of pure, fresh water is absolutely essential for the health of cows.

Barns and Barnyards

The barns and barnyards where milch cows are kept should be free from manure, pools of stagnant water, dirt and refuse. The ground should be well drained so that it will not become water-logged. Such ground should be located on elevations to assure proper drainage. The habit of allowing the refuse to accumulate in large quantities before hauling it away is not



only repulsive but very unsanitary and may become a source of pollution of the milk supply.

Stable should be constructed to assure proper ventilation and to provide proper shelter for the animals. The floors should be of material that is non-absorbent, well drained, and easily cleaned. Concrete is best. Each cow should have a separate stall furnished with a stanchion. The walls should

be of material that can be cleaned. There should be 600 cubic feet space for each cow in the barn.

Bottling

Milk should be strained through gauze placed over the wire strainer. All the utensils should be thoroughly cleaned after each milking and, if possible, sterilized in a steam sterilizer. The straining should not be done in the barns where the cows are, but in special separate milk houses. The bottling should be done only in establishments specially fitted for such purpose.

Proper Temperature

Milk should be kept at a temperature not above 50° F. during transportation. The cans or bottles should be properly covered, sealed, and the milk protected from too much agitation.

Because milk undergoes a very rapid change, beginning almost as soon as it is drawn from the cow, it is necessary to either consume it in a short time or provide some means of preserving it. Milk soon deteriorates, becomes sour and unfit for use as food.

The best means of preserving milk is to keep it at a low temperature. Bacteria are not destroyed in low temperature, but the activity is inhibited and their development retarded. In this way milk is kept from souring and from undergoing fermentative changes. The digestibility and character of milk are not changed by cold, and it will be sweet for a day or even longer if kept at a temperature under 50° F.

An entirely sterile milk may be furnished only by raising the temperature to 248° F. for at least two hours, but this destroys the milk ferments. There are certain changes produced by boiling milk which renders it less desirable for food, making it less digestible. It is, therefore, especially undesirable for infants.

PREPARATION OF MILK AND MILK PRODUCTS

Pasteurization of Milk

In pasteurizing milk it is heated to a temperature of 60° C. (140° F.) for a period of twenty minutes. This destroys the so-called pathogenic germs, yet does not destroy the ordinary milk ferments. It does not change its digestibility nor alter the taste or appearance.

All of the so-called pathogenic germs, such as tuberculosis, typhoid, dysentery and diphtheria, for example, are completely destroyed by pasteurization, but the ferments are not destroyed and the milk is in no way altered. This process may be accomplished on a large scale and thus furnish as safe milk for commercial consumption. Pasteurized milk should be rapidly cooled after heating, and if kept cool furnishes a clean, healthy milk entirely safe and satisfactory for infant food as well as for adults.

Pasteurization furnishes a purified milk but not a pure milk. It is undoubtedly the best means of preservation and may be considered as bearing the same relation to purification of milk as filtration bears to purification of water.

The use of formaldehyde, borax and boracic acid is as objectionable in artificial preservation of milk as in the preservation of meat and other foods and should not be tolerated.

Condensed Milk

Milk is condensed by removing some of the water. It is made either from skim or whole milk. It may be unsweetened or sweetened with cane sugar. Condensed and evaporated milk should contain a label stating the grade of milk used. Condensed and evaporated milk are poor in vitamin C.

Dry Milk

It has been found that by certain processes it is possible to dry milk, taking all the water out and leaving a powder. This may be accomplished and still retain most of the nutritive value of the milk. Vitamin fat soluble A and water soluble B remain practically the same, but water soluble C vitamin is diminished. Babies fed on dried milk will thrive, but orange juice or some other food containing antiscorbutic properties must be given to compensate for the loss of vitamin C. Dried milk provides an adequate supply to many parts of the country and to the cities, where it is difficult to obtain fresh milk.

Butter

Butter is produced by placing cream in a proper apparatus and agitating or churning it until the fat globules coalesce into lumps. These lumps are then taken out of the serum known as the buttermilk and the water and milk worked out until it becomes more or less solid. When butter has had the milk and water worked out of it the constituents should be in about the following proportions: Fat, 83.5%; curd, 1.0%; ash, 1.5%; milk sugar, 1.0%; water, 13.0%. By weight butter should never contain more than 16% of water and should contain at least 80% of fat.

Owing to the conversion of the fat into fatty acids butter will, in the course of time, become acid, rancid and unfit for table use.

Oleomargarine is a product resembling butter. It is manufactured from animal fats and vegetable oils. It is not as desirable an article of diet as butter. It contains margarine fat and only .5% of the volatile fats, while butter fat contains about 8%.

Oleomargarine may be distinguished from butter by boiling. Butter boils more quietly and a foam is formed on top,

while oleomargarine sputters much like oil mixed with water and there is little or no foam produced.

Cheese

Cheese is manufactured from skim milk, whole milk, or milk to which cream has been added. The more cream the richer is the product. Coagulation of the milk is accomplished by adding rennet; the curd is then pressed to expel the whey; next it is placed in molds and kept in a cool place to ripen. After cheese has been properly ripened it makes an excellent article of diet. It contains a large proportion of nitrogenous substances. There are many grades of cheese, the quality depending not only upon the process involved in the manufacturing, but also upon the richness of the milk from which it is made.

CHAPTER XVIII
MEAT

MEAT

Meat, an Article of Diet

Composition of Meat

TOUGH MEAT
TENDER MEAT
CHANGES AFTER SLAUGHTER
REFRIGERATION

Food Value of Meat

BEEF EXTRACTS
BEEF JUICE

Sources of Meat

Care of Food Animals

FOOD
WATER
SHELTER

Meat Unfit for Food

ADULTERATED
SPOILED MEAT

Danger from Spoiled Meat

DIFFERENT INFECTIONS
TAPEWORM
PARASITE
ECHINOCOCCUS

CHAPTER XVIII

MEAT

Meat, an Article of Diet

Meat is used as an article of food by most of the civilized races. It, however, as a universal diet, is of quite recent origin. Since the modern, efficient refrigerating processes, canning, and improved facilities of transportation, the use of meat as an article of diet has become very popular and economic.

Composition of Meat

Meat is composed of muscle tissue and the associated structures, such as connective tissue, adipose tissue, blood vessels, nerves and lymphatic vessels. Chiefly, meat is found to be composed of proteins, fats, ash carbohydrates and water—the percentage of water varying from 10% to 78%, depending upon the cut. Whether the meat is tough or tender depends upon the thickness of the walls of the muscle tubes and the presence of connective tissue, which binds the muscles together. Flesh of young domesticated animals is more tender than flesh of old animals or of wild animals. Flavor of the meat is also affected by the animal's age. Muscle tissue in its inorganic content resembles the seed more than the leaf elements of diet, both in amount and in its relative proportions. Albuminoids and gelatinoids are also contained in meat to quite a degree.

Immediately after slaughter, meat has an alkaline reaction and is found to be tough and of a sweetish taste and of a somewhat unpleasant flavor. Sarcolactic soon develops, giving an acid reaction to the meat. Autolytic enzymes soon form and this action, together with the bacterial action, softens the connective tissue and fibers. This results in the meat

becoming more tender and also of a more desirable flavor. For these reasons meat should be allowed to remain under proper refrigeration for a sufficient length of time so that this action can take place. It is obvious, therefore, that meat is not so desirable for food immediately upon slaughter. Great care must be taken during the period of refrigeration that it does not become contaminated.

Food Value of Meat

The presence of proteins and fats in meat determines its nutrient value. Nitrogenous extracts, also known as meat bases, have but little value as foods. As already stated, meat compares more favorably with seeds that are used for diet rather than the leaves of plants. As a matter of fact, this food, more particularly muscle tissue, differs from seeds only in one respect. This is in the quality of proteins. In meat the proteins are complete while those of seeds are incomplete. Meat is relatively poor in the vitamin, fat soluble A. There are many articles of diet which have a much higher nutritive value than meat.

There is prepared from beef a soup stock which is known as beef extract. Manufacturers of this soup stock assert that one pound of beef extract contains the nutrient properties of many pounds of meat. Doctor Wiley, however, says that this assertion is erroneous. These extracts are of value since from them there may be obtained a more speedy, soluble nutrient which may be desirable for patients in a weakened condition. There should be a distinction, however, made between beef extract and beef juice. Beef juice is obtained by putting the meat under pressure and forcing the juices out. Thus, this juice contains a larger percentage of albuminous nutrient material than does beef extract.

Sources of Meat

Cattle, sheep and swine form the principal source of meat, although horse flesh and even the flesh of dogs is used in some

countries. From a hygienic or sanitary standpoint there are no particular objections to the use of horse or dog meat for food. Horse meat is very much coarser than either beef or pork; it does not have the same marble appearance and has a sickening odor. When properly prepared it is difficult to distinguish it from beef.

From a hygienic standpoint there are certain conditions which render the meat of animals unfit for food. They are: First, the death of animals from old age, dis-ease or accident; second, animals dying from injury, drugs, overwork or fright; third, animals that are too young.

Care of Food Animals

Proper care of the animal bears a close relationship to its health and consequently to the health of the people who feed upon its flesh.

The domestic animals should be properly housed and protected from the weather, should have plenty of pure water and should be provided with wholesome food. They should be properly inspected before they are slaughtered and after the animals are slaughtered and prepared for market the meat should be thoroughly inspected.

Meat Unfit for Food

Meat is often rendered dangerous to health by the adulterating processes through which it is put. There are many ways in which meat may be adulterated. (See table under Food Adulteration.)

Slightly spoiled meat is a great source of danger. It is very difficult to recognize spoiled meat, even though the deteriorating processes which have taken place are great enough to injure the health of those who eat it. We are not referring to decomposed meat, for it is a very easy matter to recognize this by its offensive odor. The appearance may not thoroughly be affected by even the most serious infection of

the deadly poisons. However, inspectors are supposed to reject meat that does not possess the raw, fresh appearance, or meat from which any amount of fluid of an abnormal color exudes upon pressure.

Danger to Health

From a hygienic standpoint the danger to health from meat may be classed as: (a) infection from entozoa; (b) infection by bacteria; (c) toxins and ptomaines. These conditions may result from: (a) dis-eases of the food animals; (b) postmortem changes that may take place in the meat; (c) infection of the meat; (d) adulteration; (e) the use of preservatives. Such parasites as tapeworm, trichina and echinococci may result from spoiled meat.

Tapeworm

Meat infection may result in two species of tapeworm, the tænia saginata and the tænia solium. The tænia saginata is due to infection from beef, which is known in lay terms as measly beef. The tænia solium is due to infection from pork, which is known in lay terminology as measly pork. The larva of the tænia solium appears in hogs and is known as bladder worms, from the fact that it is found incased in small cysts in the intestines, the muscle fibers, brain and other parts. The larva of the tænia saginata is found in the muscular fibers and connective tissue of cattle and when ingested in man develops into the tænia saginata.

Trichinosis

There is a parasite known as trichina spiralis which is found as a minute spiral worm in the muscular fibers of pork. It is visible to the naked eye as white specks. The ingestion of this parasite into a person with subluxations, causing interference with transmission of mental impulses, produces a condition which is called trichinosis. It is an acute condition and the symptoms resemble typhoid fever. It often results fatally.

Echinococcus

The echinococcus is sometimes found in the meat of hogs, sheep and cattle. When the eggs are ingested in man they hatch and the embryo pierces the mucosa and lodges in the tissues, forming a hydatid or cyst. These cysts develop and increase in size as the larvæ multiply.

As the eggs are ingested into the digestive tract of man there is created a necessity for adaptative action on the part of Innate Intelligence for the purpose of expelling them. This action will be sufficient to result in the expulsion of the larvæ if there is no interference with the transmission of mental impulses to the tissue cells. When this action takes place there will be no injury done, but if the action does not take place the eggs remain in the body and hatch, producing what is known as a hydatid dis-ease.

SECTION II

CHIROPRACTIC PEDIATRICS

CHAPTER I
THE BABY

CHAPTER I

THE BABY

Chiropractic has nothing to do with obstetrics, but the chiropractor should be informed on the subject of child hygiene. It must be remembered that our idea is not to substitute here for the services of the obstetrician, a food diet for the infant when the mother is unable to nurse her child. The proper application of Chiropractic will eventually enable the mother, who might otherwise be unable to do so, to nurse her baby.

The child is the most helpless of the animal kingdom and requires special attention. This must come through the observation of Nature's laws and an educated adaptation by means of substituting the educated mind of the adult for that of the infant.

Feeding

The child that is normal will give little trouble since Nature has made provision for all processes necessary to maintain the normal functions of the body. In order that these processes be maintained it is necessary to have food, proper environment, and sufficient exercise. When the mother is able to nurse the babe the problem of nourishment is solved. If the mother is unable to nurse the child and if the condition which makes this impossible is of such long standing that adjustments will not get results on the mother within the nursing period of her child, then the question of baby food should be left to the obstetrician who can prescribe the proper diet.

If the child has difficulty in digesting the food, adjustments should be given to enable Innate to bring about the

proper adaptation. The bottle fed baby will require more care than the breast fed baby. Special care must be exercised to keep the bottles and other receptacles in a proper sanitary condition. This can be done by boiling them. Great care must be taken that the nipples used on the bottle are not allowed to become sour and otherwise unhygienic.

Cows' milk may be used for bottle fed babies, but the most rigid sanitary measures should be used in producing and delivering the milk. There are many baby foods on the market, but the prescribing of food for the bottle-fed baby does not come within the scope of the chiropractor. This should be left to the obstetrician who has specialized in this work. It is not within the scope of Chiropractic to prescribe the kind of food that a bottle-fed baby needs, but the chiropractor must realize the importance of the right kind of food and the necessity for a proper innate adaptation to the kind of food given. Proper feeding is necessary for normal development, although it alone will not insure proper growth and development. The digestive organs must work normally and there must be proper coördinate action between the glands of the body. For this proper balance to be maintained there must be a normal transmission of mental impulses to all parts of the body.

The child that is getting a properly balanced ration and still is not developing normally should receive immediate attention at the hands of a competent chiropractor. No phase of the chiropractor's work brings such gratifying results as the care of infants and babies, yet in no other phase will he find so much to baffle him. If the child is unable to digest the food then adjustments should be given.

Sleep

The infant requires much sleep and for the first two or three days this sleep will be very deep. The ordeal of labor is very trying on the infant and in cases involving great

labor difficulty the first sleep of the infant may be so profound that it may appear to be coma. This may last for several hours, but if there are no convulsions or contractures there is no occasion for alarm; otherwise, this might indicate an incoördination in the brain.

After this first deep sleep, and especially after the first month, the infant will not sleep so soundly, although the sleep will be quiet. The deep, heavy sleep of childhood will be observed after the second or third year. The healthy infant sleeps almost all the time during the first few weeks, usually from twenty to twenty-two hours out of twenty-four. After that and for the first six or eight months, he sleeps from sixteen to eighteen hours out of the twenty-four. The healthy infant a few weeks old will awaken only when disturbed or when hungry. A child one year of age should have at least fourteen hours of sleep and more would not be excessive. This sleep should be taken about twelve hours at night and the balance during the day. A child two years of age requires about the same amount. At four years, eleven to twelve hours may be sufficient. Up to six years of age the child should take a daily nap. Ten to eleven hours' sleep is considered sufficient from the age of six to ten years. The youth up to sixteen or seventeen years of age should have not less than nine hours of sleep and even more will not be excessive.

The nervous mechanism of the infant is a very delicate organization and often the fond parents do the child an injustice by not giving due consideration to the environment surrounding him the first year of life. The greatest development of the brain takes place during the first two years. To have the proper development of the nervous system there must be a quiet environment and the elimination of anything that will excite the child or tend to create nervousness. If the child is unduly susceptible to noise and is irritable and nervous, cries out or is too easily startled, there is a cause for this and a very careful analysis should be given and the causative

subluxations found and adjusted immediately. The nervousness may be due to some disorder such as gastric, intestinal indigestion, poor elimination or directly to a cervical subluxation.

Playing violently with the young child should not be indulged in. It is a common failing of parents to want the baby to make a good appearance and therefore he is often stimulated to laughter by means that are detrimental to his health. This should not be done.

Exercise

The need for exercise is quite apparent and this need is as great in the infant as in the adult. Proper exercise is important from the standpoint of hygiene and we will readily realize this when we observe the provisions which have been made in Nature to take care of this very important process. The child gets his exercise from the natural instincts in his nature to run and play. His curiosity performs an important function in this respect. This keeps him running about to investigate the things about him. This takes care of the child that is thrown in a natural environment where there is plenty of room for him to run and play indoors and out, but it does not take care of the infant and the child in the city or apartment who gets the proper amount of exercise only where there is special provision made for it.

The infant gets his exercise by kicking, therefore the clothing should not be too tight. If it is, it prevents this natural exercise which is an adaptation on the part of Innate Intelligence. It is advisable to place the nude baby on his back for a few minutes at a time, preferably following the bath. In this way he can kick to his heart's content. Crying is another means of exercise open to the child. The lusty cry of the infant is an advantage enabling the expansion of the lungs and the exercising of the abdominal muscles, the diaphragm and other structures that would otherwise get very

little exercise. Of course attention must be given the crying child to see that there is nothing wrong. The crying may be the result of pain or discomfort from the clothing, but it does not take a mother or nurse long to recognize the different cries.

The child gets a certain amount of exercise from the handling which he receives. A child that is left in the crib and does not get the proper handling will be fretful and will not do well. Of course the infant must not be handled roughly and at no time should he be disturbed from sleep. The child who is given opportunity to exert himself and who receives the proper exercise through handling will relish his milk, digestion will be normal, other things being equal, and in every way he will present a more healthful appearance.

Children old enough to creep will get a sufficient amount of exercise in this way. Precautions must be taken, however, that the child is not allowed to remain on the floor when there are drafts or when the floor is cold as it is likely to be in winter in homes that are not provided with furnace heat. It must be remembered that the child is very curious and is likely to get hurt unless properly protected. He should not be restrained in creeping and he should be permitted to spend some time romping on the floor each day. Children should not be encouraged to stand when too young since the weight of the body tends to produce bow-legs.

Outdoor exercise should be provided for the children at an early age. This should include every sort of exercise and play. It is an advantage to have systematic games, for this not only gives a regular amount of exercise but also has an influence on the mind of the child which will aid in forming regular and systematic habits of thought and action. In early childhood there need be no difference in the exercise of the two sexes. It is necessary only to regulate the amount of exertion for the more delicate children. In this respect competitive games may tend to stimulate children to play too

hard in an effort to win. Especially is the delicate child likely to overdo since no child likes for other children to know that he is not as physically fit as his playmates. There are no objections from a hygienic standpoint, for the exercise to be sufficiently strenuous to produce muscular fatigue, but it must never be so strenuous or so prolonged as to produce muscular exhaustion. The exercise should develop all parts of the body. In this way there will be a symmetrical body development.

Playroom

In stormy weather and in winter time when children can not get outdoors they should get exercise indoors. In practically every home a room could be fitted up as a playroom or nursery. It need not be elaborate and could be a bedroom used for a playroom during the day. This room should be well lighted and not kept too warm. The right temperature is about 55° F. Since an abundance of light is necessary the room should not be on the north, for the direct rays of the sun are to be desired and some provision should be made to admit them. All drafts must be avoided, yet a sufficient amount of air must be admitted so as to prevent the air from becoming vitiated. The best method of accomplishing this is by means of ventilators placed in the windows. Occasionally the doors and windows should be opened and the room thoroughly aired. This should be done while the children are absent from the room.

The furniture in the playroom should be substantial and of such a character that it can easily be cleaned and kept in a sanitary condition.

Sleeping Rooms or Nurseries

When it is possible in a home a room should be set aside for the nursery. This room should be well lighted, properly ventilated, and the heat and humidity should be carefully regu-

lated. This room is to be the chief home of the infant for the first few months. Therefore it should meet the needs of the infant. It should receive the direct rays of the sun during the day. No processes, such as preparation of food, or washing of diapers, for example, should be permitted in this room. As far as possible gas plates, heaters, or gas lights should be avoided.

The nursery should not be kept too warm. A temperature of 70° F. is proper during the day. During the first few weeks it should not be allowed to drop below 65° F. through the night. For children over two months of age the temperature during the night may go as low as 60° F. but not below 50° F.

It is more sanitary for the infant to have a separate bed. Both mother and babe will rest better and there will not be the tendency for the baby to nurse too frequently during the night. The infant should be placed in a crib without rockers. A basket or bassinet is very convenient and sanitary. The sides of the bassinet may be lined and this will prevent drafts and assist materially in keeping the baby warm. The pillow should be small and soft. It is advisable to change the position of the child occasionally while sleeping. It must be remembered that the child is unable to turn should he become cramped or should he become tired from lying in one position. The average mother knows how to take care of her child in a general way and nurses have had special training in this respect, but these simple necessities should not be beneath the notice of the chiropractor. Especially is this of importance in determining the cause of irritability in the infant. Attention must be given to skin irritation, especially resulting from carelessness in the changing of the diaper and in keeping the body of the child otherwise clean. It is not, however, the intention of the author to present in this text complete instruction in the care of infants except from the general viewpoint of hygiene. The chiropractor is not to be a nurse, but he must know the rules of hygiene since there

are many conditions of infancy which result from a violation of these rules.

After the first week or two the infant should be taken out of doors if it is in the summer. The open air is healthful for the young children and they should be kept outdoors a part of each day. The eyes must be protected from the sun and the head from the wind. The child, of course, should be properly dressed for out of doors. At first the child must be kept out only a few minutes, since sufficient time must be allowed for adaptation to take place, or in other words, for the child to become accustomed to the change. Before children are taken out the first time it is well to get them accustomed to the change by opening the doors and windows of the room that there may be a gradual cooling of the temperature. The child born in the fall or winter must not be deprived of fresh air even though the weather will not permit the outside airing. The child may be dressed as for an outdoor airing, then the doors and windows opened. Great care must be exercised or the child will take cold.

Control of Bowels and Bladder

While the chiropractor will have little if anything to do in advising mothers how to train their children to answer the "call of Nature," yet he should be familiar with methods that are suggested for such training and certainly he should recognize the importance from a hygienic standpoint of such regular habits. It might be stated here that the normal movement of the young infant's bowels should be at least twice a day.

At a very early age children learn to evacuate the bowels when placed upon a nursery chair. This requires a great deal of patience and regularity on the part of the mother or nurse. Even at the early age of three months the child may be trained to such a degree that the napkin will seldom be soiled from the movements of the bowels. This saves an enormous amount of work and certainly is more pleasant for the child, and

much more sanitary. There is, however, another advantage having the young child form this regular habit; it is very probable that a habit formed this early will be followed the entire life, and thus the tendency for the educated mind to neglect this very important innate function will be averted. The best time to place the child upon the nursery chair is immediately following feeding.

Training the child to empty the bladder at stated times is more difficult, although with patient and intelligent effort this may be accomplished. Many children at the age of one year are able to indicate when they desire to empty the bladder. This adds materially to the comfort of the child and certainly makes it very much easier to care for him. Some mothers are able to dispense with the diapers during the day by the time the child is a year old and some even at an earlier age. If there is no special effort put forth to train the child in this respect it will be necessary to keep him in diapers as late as two and a half years. After this age the child should have no difficulty in holding the urine during the night. If there is such difficulty adjustments should be given to correct the cause for the nocturnal enuresis.

Growth and Development

Since growth of the child is the best evidence of health, some attention should be given it and should there be any arrest in development the cause should be carefully determined. Arrested progress always indicates that something is wrong and therefore adjustments are needed. Although normal growth does not prove perfect health by any means, yet if the child is not growing and properly developing he is not enjoying proper health.

Weight

From observation made of a great number of cases by authorities the average weight for girls at birth is a little

over seven pounds, while that of boys is about seven and a half pounds. Some weigh more, some less. There is a loss of weight the first three days, this being greatest the first day. After the third day the child begins gradually to increase in weight and by the tenth day will have gained all that was lost the first three days, reaching the birth-weight about the tenth day. The artificially fed babies gain more slowly, even though they may be perfectly healthy and vigorous. The greatest increase that is made in the weight of children the first year is during the first three months. Normally the average child will gain from five to six ounces each week during the first six months, but only about half this much the second six months. The data given here must be considered only as an average, no standard can be set, but the variation must be within certain limits, otherwise it will be indicative of abnormality.

During the first two years the weight of children is considered with reference to age, but after this it is studied with relation to height. This latter method is much more accurate. The age, however, must always enter into the consideration, for of two children of the same height but of different ages the older should be the heavier. There is much less variation in weight with reference to height than with reference to age. Normal weight differs with different individuals and is governed by various conditions so that a stated weight can not be decided upon as normal in all cases. The degree of deviation from the average weight that one may experience and still be within the normal range is a matter of opinion. If the weight of the child is more than 10% below the average for his height it is a fair indication that there is a lack of proper nutrition, either because he does not have proper food or because the tissues can not assimilate the nutrition due to interference with transmission. In a case of this kind the child should be carefully analyzed and adjusted. The disturbance may be in the digestive tract or due to an impairment in the serous circulation.

Children twelve years of age and over gain less regularly and more spasmodically. For this reason there will be a greater degree of variation at this age. The weight may fall as much at 12% below the average and still the child not be considered underweight, or as much as 20% above the average before being considered overweight. If an observation of the weight is to be of any value it must be made over a period of time. The important thing is to observe whether or not there has been a gain in weight over that period of time. Loss of weight over a period of time indicates that Innate is compelled to draw upon the physical in her processes and that there is no new material with which to replace the old. This is a warning from Innate that should be heeded. The following table will give the idea of the average weight for the given height of the child.

This table is based upon a general average taken from various authentic sources and is for the purpose of giving the chiropractor a general basis upon which to make observations in growing children. The average weight is given with relation to the average height and approximate age from the second to the sixteenth year of life inclusive.

Separate weights have not been given for boys and girls. The average weight of boys is about two pounds heavier than that of girls at the same age up to about the thirteenth year. From fourteen to sixteen years of age the average weight of girls is from three to ten pounds above that of boys. The greatest increase in the weight of girls takes place between the thirteenth and fourteenth year, while with boys this increase is between the sixteenth and seventeenth year.

APPROXIMATE AGE	AVERAGE HEIGHT	AVERAGE WEIGHT
2 yrs.	2 ft. 9½ in.	27.5 lbs.
3 "	3 " 0 "	32.2 "
4 "	3 " 4 "	37.3 "
5 "	3 " 5 "	40.5 "
6 "	3 " 7 "	44.2 "
7 "	3 " 9 "	48.6 "
8 "	3 " 11 "	54.0 "
9 "	4 " 1 "	58.8 "
10 "	4 " 3 "	64.8 "
11 "	4 " 5 "	70.6 "
12 "	4 " 7 "	77.2 "
13 "	4 " 9 "	90.3 "
14 "	5 " 0 "	101.9 "
15 "	5 " 2 "	111.5 "
16 "	5 " 3 "	118.8 "

The following table compiled by A. B. Hender, M. D., D. C., Ph. C., Dean of the Faculty of The Palmer School of Chiropractic, gives the average weight of the child from birth to one year of age. Dr. Hender has had years of experience as an obstetrician, and is well known to the chiropractic profession. These statistics are compiled by him from personal observation made of over 5,000 children, covering a period of over twenty-five years of active practice as an obstetrician.

AGE	WEIGHT	AGE	WEIGHT
1st mo.	7 to 10 lbs.	7th mo.	14 to 17 lbs.
2nd "	8 " 11 "	8th "	15 " 18 "
3rd "	10 " 13 "	9th "	17 " 19 "
4th "	12 " 14 "	10th "	18 " 20 "
5th "	13 " 15 "	11th "	19 " 21 "
6th "	13 " 16 "	12th "	20 " 24 "

Height

The same thing can be said about height as about weight of children. There is no standard, since there are so many variations to consider, but there is a general average. The average length of the infant at birth is about twenty and one-half inches. The average normal growth the first year is about nine inches. Growth in height of the child does not indicate much in the way of nutrition, since a child may grow in height and at the same time lose in weight. The greatest growth in height is made at the time of puberty. Girls begin this rapid growth about twelve years of age and will mature more rapidly than boys, since boys do not begin this rapid growth until the thirteenth or fourteenth year; but, in the fifteenth year the boys will be taller than the girls.

Growth in height is not retarded by malnutrition to the same degree as is weight. The average growth of the normal child during the second year is about four inches; for the third year a little less; for the fourth year still a little less, about three inches. Bowditch tells us that after the fifth year the average growth is about two inches a year up to the time of puberty.

THE SPECIAL SENSES

Sight

The eyes of the infant are very sensitive to the light and every effort is made by the child to avoid bright light and thus protect the eyes from glare; the eyes will innately close when a bright light is brought before them. For the protection of the infant's eyes the room should be kept darkened for the first few weeks. A subdued light will usually attract the attention of an infant and as early as the sixth day the child may even turn the head in an effort to follow the light with the eyes.

It is not uncommon for the eyelids to remain partly separated during sleep and for the movement to be more or less irregular during the first few weeks of life. The muscles of the eyeballs do not always coördinate in their action. This often results in temporary strabismus when the infant is looking intently at an object. Perfect coördinate action is often as late as the third or fourth month.

Hearing

The hearing of the infant is very acute, although it is asserted that the child is unable to hear for the first twenty-four hours after birth. This is due to the absence of air in the middle ear. During the process of respiration air is gradually admitted to the middle ear and hearing becomes very acute, so much so that sharp noises will startle the child. For this reason the nursery should be so located that it may be as free as possible from noise. Noise is trying on the nervous system and should be avoided as far as possible. As early as two months of age the infant will turn his head in the direction of the noise.

Touch

Certain portions of the infant's body are more sensitive than others. The tactile sensibility of the lips and tongue is highly developed. This facilitates the process of nursing. The forehead and external auditory meatus are more sensitive than other parts. This creates a necessity for protection of these parts. The child's head should be covered, but not the face, when taken out of doors. Touch is less acute in the infant than in the older child.

The tongue of the young infant is very susceptible to temperature. He will show a dislike for the bottle if the milk is too hot or too cold.

Taste

At one time it was thought that the child at birth had no sense of taste, but now it is agreed that even at birth this sense is extremely acute. The newly born infant is unable to distinguish sweet, sour and bitter. The sucking movement is excited by the taste of sweet, some authorities believe. With bottle-fed babies a difference in the taste of the food will be quickly noticed and it is with difficulty that he can be induced to take anything that is distasteful such as sour or bitter substances. The child very early will show that he enjoys sweets.

Smell

The acuteness of this sense is not so easily determined in the infant, although there is sufficient evidence to warrant the conclusion that sense of smell exists from the beginning; however, the ability to detect different odors is not developed to any great extent until later in childhood. It is believed that the sense of smell plays an important part at the beginning in the child finding the mother's breast.

SPEECH

The age at which the child begins to talk varies with individuals and also with circumstances and environment. Girls on the average will learn to talk earlier than boys; the average is about two months earlier. The average child begins to say such words as mamma and papa a little before one year of age. Other simple and easy words are learned until by the second year he is putting words together. How early a child learns to talk depends to a great extent upon the amount of time given him by adults in trying to teach him. The words that he learns depend largely on what is taught at the beginning. The reason for the average child learning to say papa first is largely due to the efforts of the

mother who induces the child to say this word; then naturally an effort is made to get the child to say mamma and from this word attention is directed to any pets there may be in the family. Then the names of objects are learned. Verbs are usually next learned then adverbs and adjectives. Following these in order are the conjunctions, prepositions, and articles. Personal pronouns are the last to be learned.

Children who are permitted to associate with other children will usually learn to talk earlier than those who are reared alone. If the child has not learned to talk at two years of age he may be mentally deficient; or failure to talk may be the result of being deaf or some other incoördination of the vocal apparatus may exist. As soon as a child is discovered to be mute he should have immediate chiropractic attention. Many such cases are on record which show excellent results obtained through adjustments.

HEAD

The occipito-frontal measurement of the child at birth is from 13.52 inches to 13.90 inches. The most rapid growth of the head takes place during the first year. With the average child this growth is about four inches. For the first few months the growth is about half an inch per month. During the second year the circumference of the head increases only about one inch and for the next three years, about one and one-half inches. From this time until puberty, about five years, it increases only about half an inch. The head develops so rapidly so early in life that it appears to be all out of proportion for the body.

Sutures

In syphilitic infants or in premature birth, the cranial bones may be distinctly separated. This condition does not, however, necessarily prove that either exists for often subluxations are produced at the time of birth and these prevent the

normal expression of Innate Intelligence in bringing about the adaptative processes necessary to close the sutures. This is an abnormal condition and should receive careful consideration at the hands of the chiropractor. Normally the main sutures ossify at about the end of the sixth month, although there may be some mobility at the end of the ninth month. If after this the sutures have not entirely ossified the child should be carefully examined for subluxations.

Fontanels

Under normal conditions the anterior fontanels should be completely closed at the age of one and a half years. If at the end of two years they have not completely closed it is abnormal and indicates cretinism, rickets or hydrocephalus. In case of hydrocephalus the sutures will be distinctly separated and the head will be enlarged. This condition may also obtain in rickets. When the fontanels are slow in closing the child should be very carefully analyzed and an effort made to find symptoms of other conditions which might be responsible for this abnormality. Most excellent results have been obtained from chiropractic adjustments in these cases. It is quite as objectionable for the fontanels to close too soon as it is for them to be too slow in closing and it may be much more serious. There are many cases on record in which the fontanels have been closed when the child was born. A case of this kind is ordinarily beyond the reach of Chiropractic. The closure of the fontanels during the first few weeks, or even at the middle of the first year, indicates microcephalus.

Normally the anterior fontanels should be completely closed about the eighteenth month, although it may be as late as the twenty-second month. In rachitic children it may be as late as the third year. In cretinism the fontanels may become very large and sometimes do not close until the eighth year. In hydrocephalus also the fontanels become very large, the head develops rapidly to an enormous size and this

results in the spreading of the sutures. If these cases receive adjustments early enough in life, excellent results are obtained.

The posterior fontanel is very much smaller than the anterior and closes about the second month, normally.

Shape

In most cases the head of the infant is more or less compressed during labor. In hard labor it may be so greatly compressed that it gives the appearance of being deformed, but this apparent deformity soon disappears, usually from the third to the fifth week. Healthy children and especially good natured ones are sometimes neglected and permitted to lie in one position for such a length of time that the head becomes misshapen. Usually in such cases the child is placed on his back. This results in the flattening of the back of the head. This, however, may be easily corrected by changing the position of the child occasionally. These variations should not be mistaken for actual deformities of the head.

THORAX

The average chest measurement of the child at birth is from thirteen to thirteen and four-tenths inches; thus it is seen that at birth the circumference of the chest is about a half inch less than that of the head. The circumference of the abdomen is about equal to that of the chest. The transverse diameter is practically the same as that of the antero-posterior, but as time goes on and the child develops, the transverse diameter increases more rapidly until about ten years of age when the shape of the thorax becomes about the same as that of the adult. The diameter of the chest increases at the rate of about one inch per year until the average of thirty inches is reached at about the age of fifteen. During childhood the thorax should be carefully observed for deformities.

Subluxations in the upper dorsal region may result in faulty postures, which in turn will result in various deformi-

ties of the thorax. If this faulty posture is not corrected and the child is permitted to grow into adult life with the deformity, it can readily be seen that such deformity will become permanent. In such cases the dorsal subluxation should be adjusted early in life to overcome the faulty posture. Innate will then take care of this temporary deviation from the normal shape of the thorax. Deformities of the thorax often indicate Pott's disease, curvatures of the spine, rickets, emphysema, empyema and cardiac disturbances. In such cases a very careful analysis should be made and the subluxations adjusted to remove the cause of the condition to which the deformity is adaptative.

ABDOMEN

The abdomen of the infant is very large in comparison with its proportion in later childhood. Up to about two years of age the circumference is the same as that of the chest, after which the chest develops more rapidly and the abdomen gradually assumes the proportions of the adult. However, the abdomen remains proportionately large up to the age of puberty. Unless this fact is recognized by the practitioner, he may suspect an abnormal enlargement of the abdomen. There are conditions in which an enlargement of the abdomen is typical, such as in various intestinal disorders and especially in rickets. In rickets the abdomen becomes gradually extended and is known as pot belly, but with this there will be other symptoms of the dis-ease. If the abdomen seems abnormally large the chiropractor should carefully analyze the child to determine whether this is the result of some incoördination or whether it is simply an idiosyncrasy of the child.

WALKING

The age at which children are able to sit alone, stand and walk, varies greatly. Some infants walk as early as the

tenth month, while others are as late as the eighteenth month. The average age at which children are able to walk alone is from thirteen to fifteen months. Other things being equal, the age at which a child walks has little significance. The first voluntarily directed movements of the child occur at about four months of age, sometimes a little earlier, when the child begins to make an effort to grasp objects which he sees about him.

At about four or five months of age the average child is able to hold the head erect when the body is properly supported. Between the seventh and eighth month the muscles have developed sufficiently for the child to sit erect by himself for a few minutes at a time. From this on, the child develops the sense of equilibrium very rapidly. Not later than nine months of age the child will indicate a tendency to stand and to bear the weight upon the feet. He may even be able to stand with a little assistance; then, in a very short time, if placed upon the floor he will show a tendency to pull himself up by a chair and stand alone. This is soon followed by the first steps and by the thirteenth month the child is walking alone freely.

Mechanical devices intended to assist the child in learning to walk are of little value and may be an actual detriment. If the child is normal, has the proper care and a reasonable environment, Nature will put him on his feet at the earliest possible moment without injury to the delicate structures of the body. If the child is extremely backward in learning to walk a careful analysis should be made to determine the reason. Rickets is a very common cause for backwardness in children, not only in walking but in other functions as well. If a child is backward in learning to walk he should not be urged, but the reason for this backwardness should be sought out and the cause adjusted.

CHAPTER II
DENTITION

CHAPTER II

DENTITION

The age at which the child begins to cut teeth varies greatly in the different individuals with no apparent reason. There are twenty deciduous or milk teeth and they make their appearance in the following order and at an average time as shown in the data. From six to eight months of age the lower central incisors appear. The four upper incisors do not appear until from the seventh to the tenth month; then the two lower lateral incisors and four anterior molars come through between the tenth and fourteenth month. From a year and a half to two years of age the four canines put in their appearance, and from two years to two and a half the four posterior molars. This completes the set. By the time a child is one year of age he should have six teeth; at the age of one and a half years, twelve teeth; at two years, sixteen teeth; and by the time he is two and a half years of age he should have the entire set of twenty. The table below gives the order in which the deciduous teeth appear and the approximate time when they may be expected. This time is subject to great variation. This variation does not necessarily indicate an abnormality. In some children the teeth appear much earlier than in others. The appearance of the first teeth may be as late as the tenth month in perfectly healthy children. However, if the delay is too great attention should be given the child.

6 to 8	months of age	the two lower central incisors.
7 to 10	" " "	the four upper incisors.
10 to 14	" " "	two lateral incisors, four anterior molars.
16 to 24	" " "	four canines.
22 to 30	" " "	the four posterior molars.

Normal children cut their teeth without any very severe symptoms. If the child is below normal, or if there are meric zones in which the structures are not receiving a sufficient amount of mental impulses, symptoms will be produced.

At the time of dentition many incoördinations may appear, not because the process of cutting the teeth produces these conditions, but because the process requires a great expenditure of internal energy to produce the eruption of the teeth, hence at such times the forces of the body are very heavily drawn upon. The force that might be used in bringing about adaptation to other conditions must be used in this process. If the child is normal the growth of the teeth will produce no more symptoms than the growth of the nails. During the time teeth are coming through the gums there may be increased salivation and drooling and a tendency for the child to chew on the fingers. Irritability and restlessness at night are very frequent symptoms. It is quite common to have gastro-intestinal disturbances and especially diarrhea.

In delicate and neurotic children all symptoms may be greatly exaggerated and may become alarming. There may be fever and acute indigestion. Diarrhea may become very severe and the child show marked decrease in weight as a result. If the child is having difficulty cutting the teeth it is evident that Innate Intelligence is unable to get the forces to the periphery. In this case the child should have immediate chiropractic attention. It is not uncommon for a temperature to run during the time just before the teeth come through the gums. In such cases a very careful analysis should be made and the child adjusted regularly until the symptoms have disappeared.

In the majority of cases when there is incoördination during the process of dentition it will be found upon careful analysis that there are conditions responsible for the symptoms other than difficult dentition and they are only exaggerated by the dentition.

After the teeth have made their appearance care should be taken that they are kept clean. This may be accomplished by washing the teeth and mouth.

The eruption of the permanent teeth causes no great disturbance and there are usually no symptoms connected with their appearance other than a little discomfort locally. The appearance of the first permanent teeth do not disturb any of the temporary teeth, since they develop just posterior to them. These are the six-year-old molars. Following these we find the incisors displacing the incisors of the temporary teeth. Then comes the bicuspids taking the place of the temporary molars. These are followed by the canines which displace the canines of the temporary set. The next to appear are the second and third molars which occupy a place back of the canines where room has been made by the development of the jaw.

The following table is given to enable the student to get at a glance an idea of the approximate age that the different permanent teeth make their appearance.

6th year of age.....	First molars just posterior to the temporary molars.
7th " " "	First incisors displacing the former incisors.
8th " " "	Lateral incisors displacing the first lateral incisors.
9th " " "	Bicuspids displacing the temporary molars.
11th " " "	Canines displacing the canines of the temporary set.
14th " " "	Second molars appearing posterior to the first permanent molars.
18th to 21st year.....	Third molars or wisdom teeth posterior to second permanent molars.

Hygiene of the Teeth

It should be remembered that these are the teeth that must serve the child during his entire life and therefore should

receive the best of attention. Want of cleanliness is without doubt responsible for much of the trouble with the teeth of children. This is especially true among the poorer class of people and those who do not appreciate the value of proper personal hygiene. Even before there are any teeth the infant's mouth should be washed and properly cleansed, and attention should be given the teeth as soon as they appear. The child should be taught early in life that it is very essential that the teeth be washed and cleaned regularly. Before the child is old enough to do this the nurse or attendant should do it for him. Food permitted to remain between the teeth will soon decompose in the temperature of the mouth, therefore care should be exercised that all particles of food be removed as soon as possible. Decomposing food has a very destructive effect upon the teeth and tends to destroy the enamel due to the chemical reaction. When there are no subluxations Innate will bring about an adaptation as far as possible, but it is impossible to change the reaction of a chemical without neutralizing it. Undoubtedly Innate does this in many instances, but it should not be necessary for Innate to do this extra work when the filth may be removed educationally.

Lack of cleanliness is entirely too prevalent among some classes of people and it will be found that children who have not had the proper care of the teeth will suffer more or less with dental caries. The common belief that many conditions and incoördinations are caused from the teeth has been proven erroneous by Chiropractic, but the chiropractor should recognize the necessity for the proper care of the teeth and when they are in need of attention the patient should be sent to a dentist. Poor teeth interferes with mastication and prevents the food being properly prepared for gastric digestion. Severe nervous symptoms may arise from toothache.

It must be remembered that proper hygienic methods alone are not sufficient to preserve the teeth in perfect condition. The teeth may be kept strictly clean and yet they decay, as

a result of subluxations causing interference with the transmission of mental impulses. If the teeth are decaying the child should be given a thorough analysis and the subluxations should be adjusted. However, the chiropractor does not take the place of the dentist. The child should be taken periodically to the dentist to have the teeth examined and any defects attended to; likewise he should be taken regularly to the chiropractor to have his subluxations adjusted.

Adjustments during Dentition

Most excellent results may be obtained in difficult dentition from chiropractic adjustments. The major for the local condition is M.C.P., but if there are accompanying conditions such as diarrhea or indigestion, the combination will include the zones that may be involved. If there are gastric symptoms then we will include an S.P.; if the intestinal tract is involved then it will be necessary to adjust a lumbar. There are some cases that require adjustments at K.P. During dentition the child should be taken to the chiropractor for an analysis and should receive adjustments to keep him in a healthful condition. Certainly it is much better to have the child in perfect health during the time the teeth are appearing for under the most favorable conditions the cutting of the teeth is very trying on the child. The idea that cutting the teeth is responsible for many abnormal symptoms in children is very old, but it is now generally conceded that the eruption of the teeth in the healthy child will cause no disturbance in his health.

CHAPTER III
ANALYZING INFANTS

CHAPTER III

ANALYZING INFANTS

One of the most baffling situations the chiropractor meets is in caring for sick babies. There are several reasons for this: The baby can give no assistance in the way of subjective symptoms. It is difficult to nerve trace with any degree of satisfaction and assurance of accuracy; it is even very difficult to keep the child still for palpation. Therefore, it becomes necessary to rely largely upon the objective symptoms and the palpation, with what verification may be obtained from nerve tracing and the spinograph. However, there is no class of patients in which the results are so gratifying as with the babies and small children, for they respond to adjustments more readily than does the adult.

There is no time in the practice of the chiropractor when he needs to have better self-control than when he is taking care of infants. There is great need of every faculty that is employed in the analyzing and adjusting, especially if the child is seriously ill. Usually the parents are more or less excited and worried and are likely to keep urging the chiropractor to do something and thus unduly influence him unless he is accustomed to such cases. If the child is in pain and crying it is likely to get on the nerve of every one present and this will tend to make the chiropractor nervous. He must be careful that these things do not influence him to act too hastily before he has had time to make a careful analysis.

History of the Case

Great care must of necessity be exercised in taking the analysis of the baby and of the small child. A very careful history should be taken. This, of course, must be obtained from the parents or nurse. This history should include such

points as whether birth was instrumental or natural, whether it was premature or full term, whether there were any peculiarities of respiration at birth, whether there have been any convulsions and what sickness, if any, the child has suffered with. Inquiry should be made relative to the condition of the bowels and kidneys, how the child sleeps, and if there is a tendency to cry out during sleep. If the child refuses to nurse or nurses with difficulty it may indicate an incoördination of the mouth or the throat.

Objective Symptoms

In view of the fact that the child can give no aid in the way of subjective symptoms, it is necessary for the chiropractor to make most careful observations and substitute, as far as possible, the objective symptoms for the subjective ones. About the first thing we see when we begin the analysis is the baby's face. It may reveal valuable information. A very careful study should be made of the facial expression and the condition of the eyes. In the face we take into consideration the color. We should look for pallor, cyanosis and jaundice; we notice whether there is perspiration, whether the face is cold and clammy or warm and moist; also we observe the expression as to the muscular condition, since there may be muscular spasms which will produce grimace. This is either the result of pain some place in the body or an abnormal action of the facial muscles. There may be a pinched expression or a look of fear or anxiety. In some severe cases the face will be expressionless, while in others it may be that of an adult.

The condition of the eyes is important. They may have a dull expressionless look. The lids may droop and the eyeballs be sunken. In cerebral incoördinations there may be strabismus, or the eyeballs may be rolled upward and inward. These symptoms are significant and should all be very care-

fully noted, for, as has been stated, there will be no chance to profit by subjective symptoms.

After a careful observation of the face and facial expression has been made, the child should be undressed and placed in a convenient position for further observation. Before the clothing is removed the room must be heated to a proper temperature so the infant will not take cold or be exposed to an atmosphere that will be distressing. A temperature suitable for the bath will be satisfactory. The child should be placed on his back and every movement of the body observed. Such movements as the flexing of the thighs on the abdomen, as in abdominal pain, may lead the chiropractor to a conclusion on the zone involved.

The general appearance of the child must be carefully considered, whether the child is properly developed and whether or not there are any deformities. The chiropractor should look for dyspnea and other objective symptoms. A very careful inspection should be made of the spine to determine any malformations or marked curvatures. The character of the cry is sometimes important, as for instance in pneumonia or bronchitis there is a short, catchy cry; the cry of laryngitis and croup will be hoarse. In extreme prostration, as in many cases of malnutrition, the cry will be very feeble.

Respiration

Since the chiropractor must depend almost entirely upon objective symptoms and upon the palpation of the infant in determining the character of the incoördination he should be thoroughly familiar with the characteristics of the normal child. The rate of respiration of the infant, especially during sleep, is of some importance. The following table is given by Holt and Howland and indicates the normal rate of respiration at different ages:

At birth	35 per minute	
At the end of the first year	27 "	"
At two years	25 "	"
At six years	22 "	"
At twelve years	20 "	"

Respiration is very much faster than this when the child is awake. If the child is at all active it may be twice as fast. It is advisable to observe the respiration to determine whether it is normal or labored, shallow or deep, regular or irregular.

Irregularity of respiration in infants is characteristic and must not be mistaken for indications of incoördination. The least excitement will disturb the rhythm; as a matter of fact, the only time there will be perfect rhythm is during sleep. In observing infants it will be found that the lungs sometimes do not expand equally. This is due to the delicate muscular walls of the thorax and does not necessarily indicate incoördination. It is well to take this into consideration when observing the infant. This must be very carefully considered when incoördinations of the lungs are suspected. Placed in certain positions one lung may expand very much more than the other in normal respiration; or in some positions, and sometimes for unknown reasons, there may be practically no expansion in one lung for a short time. This peculiarity is due to the inability of Innate to maintain adaptation through the delicate structures of the thorax to the atmospheric pressure. This might be very misleading and result in the conclusion that one lung was badly affected when there would be nothing at all wrong. However, if there are symptoms which indicate an incoördination in the lungs there should be a very careful palpation made of the upper dorsal region to locate the subluxation and the hot box.

In infants the respiration is altogether diaphragmatic; it is irregular at times; it may be superficial for a time and then deep. This irregularity continues in the child more or

less until the seventh year. After this such an irregularity indicates some disturbance and should receive consideration.

The muscular walls of the thorax are very feebly developed and are therefore very soft and yielding; a slight obstruction in respiration will result in a marked sinking of the thorax from the normal atmospheric air pressure.

Pulse Rate

It is not necessary to take the pulse of the infant, but it might be well to know what the normal pulse rate is at different ages. The following table will give the desired information:

At birth the pulse rate is from..	130 to 150	per minute
One month of age.............	120 to 130	" "
One year of age...............	108 to 120	" "
Two years of age..............	90 to 108	" "
Three years of age............	80 to 90	" "
Seven years of age...........	72	" "

Very slight disturbances will often increase the pulse rate out of all proportion to the severity of the condition. The heart will beat very much faster just from the handling of the child in making the analysis, or as a result of any excitement or crying. It may be very difficult to count the pulse because of its rapidity.

Often a very moderate incoördination will result in a marked increase in the pulse rate and especially is this true in cases in which there is slight fever.

An increase of the heart action does not, necessarily, mean that heart place should be adjusted. This increased action may be due to the natural adaptation because of handling or to nervousness at the presence of strangers. Especially is this likely to be true of the child that is old enough to notice things. It is not uncommon to have the pulse beat increased as much as 25 beats per minute in this way.

During sleep the pulse may be slightly irregular, even when

the child is normal. In cerebral disturbances it will be slow and irregular. In cerebral tumor it may be as slow as 40 or 50 beats per minute. In acute incoördinations the pulse rate may be very greatly increased. With incoördinations in such families as the poison, fever, degeneration, and some incoördinations in the spasms family, the pulse rate may be very high, even when the condition is not at all alarming. It is well to take this into consideration when observing a case so that the chiropractor will not be misled in making the analysis and that the objective symptoms may be of greatest value to him.

Zones Involved

In analyzing an infant it is well to keep in mind the zones in which incoördination is most commonly found. In the majority of cases these zones will include the gastro-intestinal tract, the respiratory tract, the kidney zones and the brain. Very frequently there will be incoördinations of the pharynx, tonsils and mouth.

The incoördinations found in the digestive tract will include all forms of indigestion and dysentery. Such incoördinations as pneumonia and bronchitis will involve the respiratory tract. From the kidneys there are the various conditions involving the poison family due to improper elimination. Meningitis and all forms of cerebral incoördinations as well as conditions of the eyes and ears are common to infancy and childhood.

It must be remembered that with an infant grave symptoms may develop in a very short time, likewise recovery may take place very quickly following even the most alarming symptoms. However, no chances should be taken for it is not uncommon for an infant previously in good health to become sick very suddenly and die within a few hours. Therefore, in handling children most careful attention should be given and conditions should always be regarded more or less serious

until developments prove otherwise. The chiropractor must realize that his success in handling infants does not depend entirely upon his observations of the case, for with every patient there must be a thorough and complete analysis of the spine. The only value to be received from the observations is that they may lead him to specific regions of the spine.

The Child's Cry

It is not uncommon for an infant to cry with no apparent localized cause. This crying may continue for hours with no other symptoms. There will be no indication of colic or other symptoms to denote the seat of the pain. The crying is constant and, while in some cases may be quite violent, yet there are no paroxysmal attacks; this indicates that the pain is constant. It is easily distinguished from a hunger cry in that the child usually refuses to nurse. If the crying persists for hours there will be more or less exhaustion. Such cases are very pitiful and draw heavily upon the sympathies of the chiropractor as well as upon other attendants. In such cases the first thing to do is to strip the infant of all clothing and look for open safety pins, rough places in the clothing, such as folds or wrinkles; foreign objects, as small buttons, for example. Usually, however, this will be done before the chiropractor is called. It may be an advantage for the chiropractor to observe the infant very carefully for a few minutes after the clothing has been removed, in an effort to locate the seat of the pain. However, this is not so very important because first, in most of these cases it is practically impossible to determine the location of pain, and second, because a very careful palpation of the child will always reveal the causative subluxation. In making the analysis the chiropractor should give himself plenty of time to make a thorough palpation. He should not be in too great a hurry to adjust the child merely because of his anxiety to relieve the crying. He must

not allow the incessant crying of the child to work upon his nerve and destroy his efficiency in caring for the patient. In these cases the subluxation may be located in any part of the spine, although it is less often found in the cervical region. If there is a subluxation in the cervical region, great enough to produce this constant crying, there is very likely to be cerebral symptoms. In these cases the subluxations are usually quite exaggerated and very often the hot box becomes the determining factor.

In a case recently an infant three weeks old had been crying constantly for several hours. The clothing had been removed and the child very carefully bathed and powdered; then instead of the clothing being replaced the child was wrapped in a blanket. Still the crying persisted. A very careful observation of the patient gave no information whatsoever as to the possible location of the cause for the crying. There was nothing that would quiet the child. He finally grew so exhausted that the cry became little more than a whimper, beads of perspiration standing out over the entire body. There were no signs of colic or tympanites. A careful palpation revealed the sixth dorsal very badly subluxated and a slight subluxation of the first lumbar. These were adjusted and the child stopped crying almost instantly and in less than ten minutes was sleeping normally. There was no return of the abnormal crying and the child had no further adjustments.

We have many such cases on record, but the citation of this one is sufficient to illustrate the results that are obtained in such cases.

Palpating the Infant

In palpating an infant the first thing to look for is the hot box. It may be possible to locate it very easily and if this is so it then becomes necessary only to list the direction in which the vertebra is subluxated. In looking for the hot

box it is necessary to use care so as not to be misled by the difference in the temperature of the back due to some article of clothing being in contact with the back and raising the temperature in that region. Notice that there has not been some woolen garment, such as the band, pressing against the spine. To eliminate the possibility of thus being misled the entire back should be exposed to the atmosphere a sufficient length of time to allow the back to become influenced alike to the temperature of the air. The majority of incoördinations of infancy are acute, therefore the hot box is present. After the hot box is located then a very careful palpation should be made to determine the direction in which the vertebra is subluxated. It is not sufficient to consider that because the patient is an infant all that is necessary is to list the vertebra straight posterior and adjust it accordingly. Laterality, superiority and inferiority are quite as essential, and the chiropractor should not be satisfied until he has convinced himself on the question of these directions. If there is no laterality, superiority or inferiority then the adjustment should be given straight toward the anterior.

In palpating an infant it is usually best to place the child on the knees of an adult in the position for an adjustment. The child will be almost constantly on the move. It will therefore be necessary for the chiropractor to adapt himself to this constant moving. The child should be placed in as many different positions as possible to make the palpation. He may be held up over the shoulder of the mother or nurse; first on one side, then on the other, this giving opportunity to palpate with both hands and make comparisons.

No effort should be made to force the child to be still. It is a good policy to hold the palpating fingers on the spine and let the child wiggle and squirm all he wants to, moving the spine beneath the palpating fingers of the chiropractor. In this way a comparison may be made of what is felt under the fingers while the child is moving.

It is quite difficult to nerve trace an infant in any measure of accuracy because the infant can not coöperate to any degree of satisfaction. In some, however, nerve tracing may be used to a certain extent by producing slight pressure and noticing whether or not the child flinches.

It is very much more difficult to palpate the cervical vertebrae of an infant than it is those of the dorsal and lumbar regions. The same technique and tactics are used, however. It is sometimes an advantage to place the child on the mother's lap in such a way that the head will be unsupported by the lap. One hand should support the child's forehead, while the other hand palpates or it may be necessary to place the infant in some other position. The chiropractor should be sufficiently resourceful to find a way to get an accurate palpation of the cervical region. Here, again, he will meet with the difficulty of keeping the child still. This makes it necessary that he be very alert and at the instant it is possible to feel the vertebra to be ready to make his comparisons quickly and decide the direction in which it is subluxated.

The cervical vertebrae of an infant are very hard to feel, but if one of the segments is subluxated sufficiently to cause pressure on a nerve that segment will be easier to feel because it is out of the median line; especially will it be easier to feel if it is subluxated posteriorly. Every possible means must be used to make an accurate palpation. If there is a subluxation in the cervical region there will very likely be symptoms which will indicate it. Subluxations are not as commonly found in the cervical region as in the other regions of the spine.

In making an analysis of the infant the importance of the sacrum must not be overlooked. It will be remembered that the segments of the child's sacrum are separated with cartilage and are subject to being subluxated. These segments coalesce later in adolescence and form the sacrum into one solid bone. Therefore it is highly important that the subluxations that

may exist between the segments be adjusted before this process takes place.

The tubercular ridge formed by the rudimentary spinous process in the median line of the posterior surface of the sacrum is of very little value in palpating the segments of the sacrum. It is best to palpate the articular crest on each side of the tubercular ridge. In this way it is possible to determine if one segment is more prominent on one side than on the other. This should be done very carefully and if a subluxation is found it should be adjusted on the side that is most prominent. The contact is on the articular ridge and the thumb may be used for nail point the same as in the dorsal region; or if the child is large enough nail point one may be used.

Whenever possible a spinograph should be made of the child. This may not always be possible with the small child and with the very young infant it may be very difficult. In many acute incoördinations it is impracticable to try to get a spinograph, not because the spinograph would not be of value, but because it is difficult to get to the office to take it. In the chronic cases a spinograph should by all means be taken. Every possible means should be used to verify the palpation.

CHAPTER IV

ADJUSTING INFANTS

CHAPTER IV

ADJUSTING INFANTS

The recoil is used in adjusting a child the same as in adjusting an adult. The young infant can be placed upon the knees of the mother or nurse instead of being placed on an adjusting table. The ordinary adjusting table will be too large for the real small infant. Care must be used that the child is placed in the correct position for the adjustment and that the neck and head are properly supported. Placing the child on a pillow on the lap of an adult is not satisfactory because the pillow is too soft and makes it more difficult to move the vertebrae. If the child is adjusted on the mother's lap care must be exercised that the mother's skirt is not drawn tightly for it is best to leave the infant's abdomen unsupported or at least not to have too solid a support.

When the mother holds the babe on her lap there is a tendency for her to raise her heel off the floor so as to make the knee supporting the child's head higher than the other. When the adjustment is given the knee will not be sufficiently solid to support the child and the vertebra will not move. For this reason the chiropractor must see that the mother's heels are both placed squarely on the floor. It is a good plan after the contact has been taken and the chiropractor is ready to give the adjustment to ask if both heels are on the floor. Nine times out of ten one heel will be lifted and the toe will be supporting the weight of the child.

In adjusting small infants in the dorsal and lumbar regions the side of the thumb may be used for nail point. In getting the contact one should palpate in the usual manner, find the vertebra that is to be adjusted, remove all fingers except the pointer finger, turn the hand so the finger is parallel with

the child's spine, then instead of placing the pisiform bone of the nail hand, place the side of the thumb in exactly the same manner as if it was nail point one. This being done, remove the pointer finger. Then instead of placing the hammer hand on the nail hand as in using the pisiform bone for nail point, grasp the thumb that is being used for nail point between the thumb and finger of the hammer hand and press the tissues tightly to make the side of the nail thumb firm. The thrust is given with a recoil just the same as in the usual manner.

It is best not to use too much force until it is determined just the amount required to move the vertebra. One will be surprised, however, at the amount of force required to move the vertebrae of a very small infant. It should be remembered that the vertebrae must move if we expect to get results. It must also be remembered that the child is small and that it is necessary to adapt the amount of force used to the size of the patient. It is not possible to injure a child with a chiropractic adjustment, but it is possible to apply an awkward force, supposed to be a corrective force, in such a way that subluxations may be produced.

This method will be used only with the smallest infants. When the child is a few months old the pisiform bone may be used in exactly the same manner as with the adult. The only difference is that the amount of force will be suited to the size of the patient. In case a straight posterior subluxation and a double transverse adjustment is given on a single vertebra the adjuster may use his two fingers, the first and second, to get contact on the transverse processes. The nail hand is then placed across the two fingers and the adjustment is given with the recoil. It will require very little force to move a vertebra of an infant on the transverse processes.

Care must be exercised that the neck is properly supported when an adjustment in the cervical region is given. It is best to place the child on an infant's adjusting table when-

ever possible. When this is impracticable the child may be placed on the lap of an adult the same as for an adjustment in the other regions of the spine. If the head is allowed to remain unsupported as is so often the case when larger babies are adjusted in this manner, there is danger of moving something that should not be moved when the adjustment is made. Therefore that part of the neck directly beneath the vertebra to be adjusted must be placed solidly on the mother's knee. The same technique is used with older patients in that the face is turned in the direction of the laterality of the subluxation to be adjusted.

With the small infant it may be difficult or even impossible to get nail point two in position to adjust, especially in the middle cervical region. In this event the side of the first finger may be used to an advantage. This will be used, however, only with the smallest infants. In using nail point two it will be an advantage to get the contact near the distal end of the fifth metacarpal bone instead of at the center as in using nail point two on an adult. In adjusting the atlas and axis it is very easy to get the contact with nail point two in the usual manner.

The cervical vertebrae of the infant are very small and extreme case must be exercised in adjusting. Sufficient force must be used to move the vertebra.

The importance of proper attention to adjusting the segments of the sacrum of the infant and small child can not be overestimated. During childhood the child is subject to many falls and jars which are likely to be centered upon the sacrum. These segments being separated by cartilage are relatively easily subluxated. If they become subluxated in youth incoördinations may develop, which in later life will result in various degrees of discomfort or even defects which will become permanent and for which nothing can be done. There are many conditions in adult life which are without doubt the result of pressure upon sacral nerve and this pressure can not

be released because of the inability to move the subluxated segments after they become coalesced.

Many deformities and incoördinations in these zones could be averted by proper attention to the segments of the sacrum during childhood. When parents realize the importance of this they will take their children to their chiropractor periodically to have the sacrum as well as the rest of the spinal column palpated. Then the subluxations that have been produced will be taken care of before they become chronic and more difficult to correct.

A careful palpation of the segments of the sacrum should be made. The most common subluxation is a rotation resulting in that segment being more prominent on one side than on the other. When a segment is found to be posterior on one side the adjustor should stand on the opposite side and palpate in the usual manner finding the tubercle of the segment subluxated, measuring to a point midway between the tubercle and the ilium with the second finger of the palpating hand. This finger should then be replaced with the second finger of the opposite hand and the pisiform bone of the palpating hand should be used for nail point. If the patient is a very small infant do not change nail hands but use the thumb of the usual nail hand and adjust the same as adjusting a dorsal or lumbar vertebra when using the thumb for nail point.

CHAPTER V

RESPIRATORY SYSTEM

CHAPTER V

RESPIRATORY SYSTEM

Children and infants are subject to the same general class of dis-eases as are adults and there are no dis-eases which are particularly peculiar to childhood. The incoördinations are not peculiar but rather the children as patients are peculiar. The incoördinations of the child's respiratory system are practically the same as those affecting the respiratory system of the adult but there are certain peculiarities of the patient that should be considered. Our work will be principally the consideration of these peculiarities rather than the incoördinations themselves. It is not our thought to produce a work on symptomatology.

ACUTE NASAL CATARRH

This is also called coryza, cold in the head and acute rhinopharyngitis. It is a very common condition in infants and small children and one that is readily recognized and easily handled chiropractically. It is very essential that we be able to distinguish between a simple acute nasal catarrh and the coryza which accompanies such conditions as measles, influenza, and nasal diphtheria. If in these conditions there is profuse discharge tinged with blood for two or three weeks, nasal diphtheria should be suspected, even though there are no other very serious symptoms. With a very young infant a persistent acute nasal catarrh may indicate syphilis. In such a case, a careful watch should be kept for more positive symptoms.

Symptoms

The onset may be more or less sudden with sneezing and a slight fever. There is a profuse discharge from the nose

in severe cases which at first is seromucous and later becomes mucopurulent. The mucous membrane is red and swollen. The equation for the mucous membrane is calorific plus and N.C.R. for the mucopurulent discharge. In severe cases there may be a temperature of 103° F. to 105° F. with marked constitutional disturbances. In the mild cases the symptoms will be less severe and many times very transient.

Results are obtained very quickly with acute nasal catarrh or coryza and when the adjustment is given at the beginning of the symptoms there will be no complications. However, if the condition is allowed to run until it has gained momentum, longer time will be required for results and there may be distressing complications. If the condition is not corrected at once the throat may become involved and even the bronchi, which may develop into broncopneumonia. Retropharyngeal abscesses may also develop. Nasal catarrh may continue until it becomes chronic.

Equation

Primarily the equation in nasal catarrh is M—. In the capillaries of the mucous membrane lining the nasal passages this results in hyperemia of the blood vessels and exudation. This results in C+ in the mucous membrane. The exudation which at first is a colorless fluid soon becomes mucopurulent from the C+ so the equation for the exudation becomes N.C.R.

Family

The family for the C+ condition in the mucous membrane is fever family, while the N.C.R. condition is in the degenerations family. The products of the degeneration may produce symptoms in the poison family.

Adjustment

The major adjustment for acute nasal catarrh is M.C.P. and K.P.

Conditions of this kind are sometimes aggravated by the care which the child receives at the hands of a careless mother. She may keep the child too warm or not warm enough. Often a child is dressed so warmly that the least exertion will cause profuse perspiration. Then the child "takes cold" because of the inability of Innate Intelligence to bring about an intellectual adaptation in so short a time. An infant may be and should be kept very warm, but as the child grows older he should be allowed sufficient freedom, especially in the summer time, to permit of exercise and yet not become too warm.

The hygienic measures to be used are attention to the sleeping rooms, which should be properly ventilated, always having plenty of air at night, and the house temperature during the day. This should be from 65°F to 68° F.

FOREIGN BODIES LODGED IN THE NOSE

Children often in their play will place such foreign bodies as peas, beans, buttons, beads and other small objects in their noses. These set up a mechanical irritation and produce swelling of the mucous membrane and often pain. If the object remains for any length of time there is likely to be a profuse discharge of a mucopurulent character. If there is such a discharge from only one nostril special attention should be given to determine the presence of any foreign body and if there be one the child should be taken to a surgeon at once. If the discharge continues following the removal it will be due to a subluxation at M.C.P., which is interfering with the transmission of mental impulses preventing normal adaptation and reparation taking place. This should be adjusted. However, if there are no subluxations the injury which was done by the mechanical obstruction will be repaired in a short time.

CHRONIC NASAL CATARRH

Chronic nasal catarrh, also called chronic rhinitis, is a chronic inflammation of the mucous membrane lining the

nasal passages and pharynx. There may be structural changes take place resulting in injury to the organs of smell, taste, hearing, speech and respiration.

Symptoms

The mucous membrane becomes congested and swollen. There is a constant mucous or mucopurulent discharge from the nose. The air passages may be partially or completely closed. If the child is old enough the nose may be easily freed from this discharge by blowing. If the child is not old enough to do this great inconvenience and discomfort will be experienced. The upper lip may become irritated, swollen and permanently enlarged and prominent from the constant blowing and wiping the nose. The excretion produces a constant irritation. There is a marked tendency on the part of the child to constantly pick at the nose; this tends to increase the irritation both of the nose and the upper lip. Usually there are adenoid growths, which will produce mouth breathing and may interfere with the function of hearing. A very marked characteristic is the inclination for the child to continually snuffle.

If the condition is allowed to remain for a long time without adjustments, ulcerations may occur on the mucous membrane; the discharge from this will be very offensive. In the atrophic form ozena is very common. Ozena is a very fetid discharge from the nasal cavity associated with ulcerations which may involve the bones of the nose.

Equation

The equation is the same as the acute form with the exception that the N.C.R. condition becomes more prominent.

Family

Same as the acute form except that the degenerations family takes precedence over the other families involved.

Major Adjustment

The adjustment is the acute condition—M.C.P. and K.P. A greater length of time will be required, however, than in the acute stage, but the prognosis is always good. In caring for a child in this condition the parents and attendants should exercise care that there is no unnecessary irritation of the nose and local parts. The nose should be kept clean and as soft a handkerchief as possible used in wiping the nose. During the process of retracing discharge from the nose will pass through practically the same stages as during the progress from the acute stage. The process is just reversed. The scabs that form in the nose now begin to soften and the discharge continues to change until it becomes as it was in the beginning of the acute stage in a thin watery discharge. Finally the discharge ceases entirely and the child is well.

EPISTAXIS

Nose bleed does not often occur in infants but is quite common during childhood. It is the result of interference with the transmission of motor mental impulses to the muscular walls of the capillaries of the nose. Epistaxis may result from a fall or blow on the nose. It occurs as an early symptom of different incoördinations such as typhoid fever and measles; as a matter of fact, it occurs in the hemorrhagic form of all eruptive fevers, in some cases of diphtheria, and in dis-eases of the heart and blood vessels.

Epistaxis is often considered of little consequence, but it may be a very serious condition and even result in death. It is especially serious when occurring in infants.

Equation

The equation for epistaxis is M. There is a relaxation of the muscular walls of the capillaries resulting in the hemorrhage.

Family

Epistaxis is in the prolapsis family due to the relaxation of the muscular fibers in the walls of the capillaries.

Adjustment

The adjustment for epistaxis is M.C.P., and in most cases this is fourth cervical. In some cases the results come instantly. The prognosis is always good when the proper adjustment is given.

INCOÖRDINATIONS OF THE LARYNX

CROUP

Croup is an inflammation of the larynx characterized by a more or less severe spasm of the laryngeal muscles. This spasmodic contraction distinguishes it from similar affections in adults. The spasm produced is very often more marked and results in more severe symptoms than does the inflammation. This incoördination is also called spasmodic laryngitis and catarrhal croup.

Symptoms

In spasmodic laryngitis or croup there is a slight catarrhal inflammation of the mucous membrane lining the larynx and a marked spasm of the larynx. There may be a slight discharge from the nose and slight hoarseness. The attacks usually come on at night with a hollow, metallic cough. About this time there is difficult breathing and the cough becomes more severe and of a teasing nature, the child making every possible effort to keep from coughing. The voice becomes husky but is seldom lost. There is rapid pulse and a slight temperature seldom over 101° F. The attack lasts three or four hours, after which the child will fall asleep. The dyspnea is aggravated and the spasm increased by excitement. During

the day the child will appear well except for the slight cough and hoarseness, but the second night the attack will return with about the same degree of severity as that of the first night. Usually the attack may not return the third night or if it does it will be less severe.

Spasmodic laryngitis should not be confused with laryngismus stridulus, membraneous croup or with acute catarrhal laryngitis. According to Holt and Howland laryngismus stridulus occurs only in infants, and there is not only stridulous breathing, but also periods of complete arrest of respiration.

Major Adjustment

Lower cervical and S.P. is the combination major to use in this incoördination. Under adjustments results are often obtained immediately with no recurrence of the attack the following night.

In chronic cases enlarged tonsils and adenoid growths may be found. This, however, will not change the adjustment or the combination, but will increase the amount of time required to completely correct the condition so far as the chronicity is concerned. It will not interfere with the relief from acute attacks.

LARYNGISMUS STRIDULUS

This incoördination, according to Holt and Howland, occurs only in infancy. It is characterized by muscular spasms in the larynx with marked dyspnea.

Symptoms

There may be complete arrest of respiration for short periods, during which there will also be a marked lack of oxygenation of the blood. There may be recurrence of these attacks several times a day, and unless adjustments are given may last for weeks. There may be general convulsions and carpopedal spasms which are spasmodic contractions of the

joints of the hands and feet. During the periods of arrested breathing the face becomes cyanosed. This terminates with a slight cough or a high-pitched crowing sound produced by the sudden inspiration of air. Because of this it is sometimes called "child crowing." It is also known as thymic asthma and spasms of the glottis.

Major Adjustment

The combination major is lower cervical and stomach place. Under adjustments results are obtained in a very short time, in many cases almost instantly.

ACUTE CATARRHAL LARYNGITIS

This incoördination is found in children from one to five years of age. It may be severe and even cause death. It may be a secondary condition following measles, scarlet fever, influenza and other like incoördinations; however, it may result directly and not be associated with any other condition. It is often aggravated by inhaling steam, gases or irritating dusts.

There is congestion and inflammation of the mucous membrane lining the larynx; there is swelling and dryness of the membrane followed by an exudate which may become profuse. If the swelling is exaggerated there will be stenosis of the larynx. The vocal cords become swollen and produce aphonia.

Symptoms

The symptoms are hoarseness, dry metallic cough, which may become very severe and teasing. The onset is sudden with a marked tendency to cough, especially during the night. The voice often is entirely lost and the larynx becomes sore and painful. There is dyspnea and the respirations are short and shallow.

In some cases which develop more slowly there will be coryza for a day or two preceding the severe attack, or the

laryngeal symptoms may precede the acute symptoms. The onset, however, may be very rapid and the most severe symptoms be present within a very few hours after the manifestation of the first symptom. In the well developed case the cough is dry, metallic, barking and stridulus. The inspiration is labored. The dyspnea is severe, occurring in paroxysms during the night. There is temperature, rapid pulse and increased respiration. If the inflammation extends down into the bronchi it will result in bronchopneumonia. Laryngeal obstruction may occur often and prove very severe.

It is sometimes very difficult and in some cases impossible to distinguish acute catarrhal laryngitis from membranous laryngitis or laryngeal diphtheria. This is not so important to the chiropractor, for if adjustments are given soon enough results will be obtained before positive diagnostic symptoms have time to develop. However, it is well to be thoroughly informed on the difference in the symptoms since the chiropractor is sometimes not called in until the condition is well under way. At the onset the two conditions are very much alike, which is very reasonable to the chiropractor, since the only difference is in degree of severity, due to a different combination, and a difference in degree of the functions involved resulting from the same combination of subluxations. In the catarrhal condition the temperature is usually greater than in the membranous form. The dyspnea in catarrhal laryngitis is usually paroxysmal; it is less exaggerated during the day but worse at night, while the membranous type is constant and rapidly becomes more exaggerated. The dyspnea occurs on both inspiration and expiration, while in the catarrhal form it occurs only on inspiration. If the culture shows Klebs-Loeffler bacilli it is considered laryngeal diphtheria.

Major Adjustment

As has been stated, the chiropractor gives the same adjustment whether it is membranous or catarrhal. The major combination is L.C. and S.P. with K.P. Excellent results are obtained from adjustments in these cases. When the first symptoms are manifest adjustments should be given immediately in order to get the best results. The usual difficulty in such cases is that the parents consider the condition only a cold and of little importance. Therefore, they neglect taking the child to a chiropractor until great momentum has developed. Such cases necessitate a greater amount of time before results are obtained.

CHRONIC LARYNGITIS

This form is simply a prolongation of the acute form, but may be associated with adenoid growths of the pharynx, with tuberculosis of the larynx, with syphilis or with new growths in the larynx.

Symptoms

The symptoms are similar to those in the acute stage except they are not so severe.

It is not uncommon to find adenoid growths in the pharynx of the very young infant. There is a superficial inflammation of the mucous membrane producing a local calorific plus. This is the result of interference with transmission of mental impulses to these tissues and when this interference is removed Innate Intelligence will function normally and the growths will disappear.

Major Adjustment

The adjustment is the same as in the case of acute laryngitis. The results will be slower in the chronic case than in the acute case, but in the course of time the child will be

entirely relieved of the condition without the aid of surgery. If the proper adjustment is given during the acute attack the condition will never reach the chronic state.

A chronic laryngitis is often accompanied by papillomatous growths which occur very early in life, in most cases during the first year. This condition occurs more often in boys than in girls. The size and location of the growths determine the severity of the symptoms. There is paroxysmal cough, dyspnea, loss of voice, and hoarseness. The symptoms usually develop so slowly that they do not attract attention until the growth has attained quite a size. Holt states that the prognosis is usually serious from a surgical standpoint because there is danger of bronchopneumonia following the operation. It is also stated that operations have been largely given up because of the tendency of the papilloma to return in increasing numbers. These tumors are the result of the interference with transmission of mental impulses to the tissues, preventing the normal personification of Innate Intelligence in the production of function. Under adjustments which results in the restoration of the normal transmission excellent results are obtained. In the course of time under adjustments the growths will disappear and with them all the symptoms of the chronic laryngitis. Adjustments should be given just as soon as the growths are suspected and kept up until the symptoms have disappeared.

TUBERCULAR LARYNGITIS

Tubercular laryngitis is seldom found in infants and is rare even in later childhood. Usually pulmonary tuberculosis develops later; by some it is considered to be always associated with it. There is cough and hoarseness with aphonia, expectoration of mucopurulent or in some instances bloody character. Microscopic examination of the sputum reveals the tubercle bacilli. Results are obtained under adjustments, providing a sufficient amount of time is allowed to permit

Innate to overcome the momentum and rebuild the structures that have been destroyed.

FOREIGN BODIES IN LARYNX AND BRONCHI

Children are likely to acquire the habit of putting small objects, such as buttons, small playthings, and even pins, into their mouths. If the child becomes frightened, tries to cough, laugh or cry that which is held in the mouth at the time is likely to be drawn into the larynx and may lodge there, especially if it is sharp or has rough edges. If, however, it is a smooth object, such as a button or bean, it is more likely to pass into the bronchi, usually the right one.

When the foreign body enters the larynx there will be violent coughing which may result in the expulsion of the object. If it is not immediately expelled but becomes impacted in the larynx there will be marked dyspnea and even death from suffocation.

When the foreign body passes the larynx it will lodge, usually, in one of the bronchi or at the bifurcation of the trachea. If this occurs there will be localized pain over the region of the foreign body. There is a cough and may be spitting of blood. The irritation will result in a local inflammation; this may result in the formation of an abscess which may prove serious. In some cases following such conditions there is prolonged illness resembling pulmonary tuberculosis during which there may be sufficient relaxation in the muscular walls of the bronchi to permit the foreign body being expelled during a paroxysm of coughing. This has occurred in many cases. Following the expulsion of the foreign body the patient recovers very rapidly. In some cases there are repeated attacks of pneumonia. The health of the child becomes greatly impaired and thus he becomes easily susceptible to the acute attacks which may prove too much for the adaptability of the body.

Symptoms

The symptoms of a foreign body in the larynx are characteristic and consists in the very sudden appearance of the attacks and also in the severity of the symptoms. There will be a history of something having been in the child's mouth, or the possibility of the child having placed some object in his mouth. A metallic body can always be located by means of the X-ray.

Ordinarily these cases do not come within the scope of Chiropractic. There might be a subluxation which would prevent adaptation from taking place, and if so, an adjustment might result in a relaxation of the muscles to such an extent that the foreign body could be expelled by coughing. These cases are traumatic and should be taken to a competent surgeon at once.

EDEMA OF THE GLOTTIS

This is a dropsical condition of the glottis and is very rare in infancy or early childhood. Usually there will be other symptoms indicating abnormality of the kidneys.

Symptoms

If the edema is great enough there will be attacks of suffocation because of the interference with inspiration. There is very little if any interference with expiration. There may be hoarseness, painful and difficult swallowing and a cough. The symptoms may come on suddenly and develop very rapidly and soon result fatally.

Equation and Major Adjustment

The equation for the local condition is secretion plus (T+). If the condition is involved with nephritis the equation for the nephritis is calorific plus (C+) in the kidneys with N.C.R. in suppurative nephritis, which results in excretion minus (E—). The major adjustment is K.P. with S.P. and local L.C.

INCOÖRDINATIONS OF THE LUNGS

GENERAL CONSIDERATIONS

The thorax of the infant is shaped somewhat different from that of the adult, being more cylindrical, the antero-posterior being nearly the same as the transverse diameter. The transverse diameter begins to increase about the third year and this continues until puberty when the typical conical or dome-shaped thorax is attained.

In the infant and young child the walls of the thorax are exceedingly yielding and elastic. This is because the greater portion is made up of cartilaginous tissue before the completed ossification of the bony structures has taken place.

The thoracic muscles are imperfectly developed. This makes the thoracic walls very thin. In well nourished infants the walls are made thicker by the abundance of fat which is found deposited on them. The diaphragm is very high in the infant and this greatly decreases the capacity of the thorax as well as does the frequent distention of the stomach and intestinal tract because of the accumulation of gas. The trachea and bronchi of the infant are comparatively larger than in the adult, the air cells are much smaller, and for this reason a slight acute congestion will interfere almost as much with their function as will hepatization. This necessitates immediate action in all conditions which involve the respiratory tract, and especially those which affect the lungs or bronchi. In all such cases results are obtained very quickly under adjustments. In the child there is a greater tendency for the inflammation to spread in the lung tissue than in an adult.

ACUTE CATARRHAL BRONCHITIS

There is probably no one acute incoördination affecting infants and children that is so common as acute catarrhal bronchitis, commonly called cold in the chest. During the

cold months, and especially in the late winter and early spring, there are a great many cases. The chiropractor who is careful in handling these incoördinations will find no class of cases that will give more satisfactory results. The analyzing must be done very carefully and the vertebrae must be moved from the very beginning because if results are not obtained quickly the inflammation will spread to the air vesicles very rapidly. When this occurs there is danger of serious complications.

Symptoms

In the more mild form of bronchitis the symptoms develop rather gradually and the first noticed may be a coryza or nasal catarrh. As the bronchi become involved there will be a slight rise in the temperature, noticeably increased respiration, and a slight cough. There may be restlessness, anorexia and vomiting, usually caused by swallowing the mucous that is coughed up.

Rales are heard over the entire chest. These appear very early and may remain for some little time after all other symptoms have disappeared. It is very common to hear coarse rales with a very slight cold in the young infant.

If the condition is permitted to go for some little time without adjustments the symptoms become more severe. The cough becomes more serious, there is dyspnea, increased fever and a moderate degree of prostration which increases as time goes on. During inspiration the nostrils will be noticeably dilated. In most cases there is great difficulty in nursing. In the later stages there is usually great prostration. The cry becomes feeble and the cough weak, there is rapid superficial respiration and feeble pulse. The facial expression is dull and there may be stupor and apathy. The attacks may come on very suddenly and terminate fatally in a very short time. Therefore it is necessary for action from the adjustments to be obtained as quickly as possible.

Equation and Family

The subluxation at lower cervical or upper dorsal region interferes with the transmission of mental impulses to the bronchi. The function primarily involved is motor which results in a relaxation of the muscular walls of the capillaries. This produces hyperemia and congestion from which there is an exudate of mucous. At first it is clear, but with normal heat applied to this exudate it soon becomes mucopurulent. This gives calorific plus, therefore the equation for the mucous membrane lining the bronchi is calorific plus (C+) with N.C.R. for the mucopurulent discharge. The equation for the general fever is C+. The family is fever and degenerations.

The major adjustment for acute catarrhal bronchitis is L.C. or Up.D. with K.P. In some cases C.P. will be included in the combination.

CHRONIC BRONCHITIS

It can readily be seen that chronic bronchitis would not often be found with the very young infant. In early childhood it is more often found and frequently follows the acute attack or is the sequel of measles, influenza or whooping-cough. Unhygienic surroundings may tend to influence and exxagerate the condition.

Symptoms

There is little or no fever, although the cough is bad; there is very little if any dyspnea. The condition becomes worse during cold weather, and the patient is usually subject to attacks of acute bronchitis. There may be no constitutional symptoms and the general health of the patient may not be greatly affected.

If there is a light rise in the bodily temperature regularly in the evening, with loss of weight and slight anemia, pulmonary tuberculosis should be suspected.

Major Adjustment

The adjustment for chronic bronchitis is the same as that for acute bronchitis, Up.D. and K.P. If the child receives adjustments during the acute attack the chronic condition will not develop.

A child suffering with chronic bronchitis should be given adjustments immediately and the results will be most satisfactory, complete recovery resulting in a very short time.

BRONCHIAL CROUP (Fibrinous Bronchitis)

This incoördination is relatively rare in small children, except in diphtheria, when it appears as a contamination into the bronchi from the larynx and trachea. It may be acute or chronic and affects all ages from infancy to puberty. The characteristics are severe dyspnea and the coughing up of fibrinous casts from the large bronchi after which there is a marked improvement. As the exudate collects again the symptoms reappear. In the chronic form there is dyspnea and expectoration of fibrinous casts.

Major Adjustment

The adjustment for fibrinous bronchitis is the same as that for other forms of bronchitis. The prognosis is excellent, providing adjustments are given in time to enable Innate to overcome the momentum. Results are obtained in a very short time.

PNEUMONIA

Aside from digestive disturbances, the most common incoördinations affecting infants are those involving the lungs, and especially as a sequel following the so-called infectious dis-eases. The different types of pneumonia are named according to the area of the lungs involved and the nature of the

changes affecting them. The two general divisions are broncho-pneumonia and lobar pneumonia. These two principal groups are divided into several subdivisions according to the particular pathology and stage of development. It is not of vital importance to the chiropractor to know just what part of the lungs or bronchi is involved or the nature of the pathology. He must, however, be sufficiently familiar with symptoms to correctly determine the zone in which the incoördination is located. In bronchopneumonia the entire bronchial wall of the small bronchi is affected, while in lobar pneumonia the bronchitis is usually very superficial and the terminal bronchi and alveoli are filled with a fibrant exudate. An entire lobe may be involved or the inflammation may involve only part of a lobe. Very often the two varieties, bronchopneumonia and lobor pneumonia will be present in the same case, one variety affecting one part of the lung, while the other variety will affect another part of the lung. In children by far the larger percentage of cases of pneumonia is of the bronchopneumonia type; however, as has been stated, the type of pneumonia is of little importance, but the location of the zone or zones is of vital importance.

Bronchopneumonia occurs most often during the winter months, being more prevalent in late winter or early spring. One or both lungs may be involved, but the most common seat of the inflammation is the lower left lobe, or if in front only, the right apex. The local subluxation producing this condition will be found to be the second or third dorsal vertebra, which is producing the pressure upon the nerves and interfering with the transmission of mental impulses. As a result there is a relaxation of the muscular fibers of the blood vessels which results in a distention of these vessels in the affected area. The seat of the catarrhal inflammation is in the mucous membrane of the large and small bronchi.

Symptoms

The most frequent type of bronchopneumonia among infants is the acute congestive type. Its duration may be only one or two days. The symptoms develop very rapidly and produce a great shock to the nervous system because of the suddenness and severity of the attack. There is a sudden rise of temperature and prostration is very great from the beginning. There is cyanosis and rapid respiration. There may be no cough. There may be little or no pain felt in the chest. During respiration the expansion of the affected side will be less than that of the unaffected side. However, this must not be confused with the natural tendency found in extremely young infants; when a child is placed in certain positions the expansion of one lung will be greater than that of the other. In the severe cases there is profound stupor and other cerebral symptoms, such as dullness, apathy and there may be convulsions. The progress of the incoördination is very rapid, due to the sudden engorgement of the lungs, which in the infant produces symptoms almost the same as those of consolidation in older children or in adults. This is due to the air vesicles being extremely small. These cases should be adjusted as soon as there is a manifestation of symptoms, otherwise the momentum of the dis-ease may, because of its rapid progress, become so great that it will be impossible for Innate to overcome. When the medium and small sized bronchi only are affected, it is known as capillary bronchitis. The symptoms will be very much the same as in the type just mentioned, with the exception that in this type there is always a more or less severe cough. Prostration is not so great and the symptoms do not develop so rapidly. There is very rapid respiration with dyspnea and rales over the entire chest. There are symptoms which will indicate consolidation. While bronchopneumonia may come on very abruptly, yet it is not uncommon for the symptoms of bronchitis to merge

gradually into those of pneumonia. From a chiropractic standpoint it would make little difference to the chiropractor whether the condition was called bronchitis or bronchopneumonia, for if adjustments are given at the beginning results will be obtained before a diagnostician would be able to make a positive diagnosis.

Children with pneumonia should not be permitted to lie in one position for any length of time. A constant change in the position is essential to prevent the accumulation of the exudate in a localized area. The child may be more easily cared for and made more comfortable by being held in the arms of an adult. This will permit frequent changing of the child's position with very little disturbance to the child. In all cases of pneumonia plenty of fresh air is essential, but if there is any bronchitis, care must be exercised that the air is not too cold. In cases involving hepatization there is no danger of having the air too cold.

Symptoms of Lobar Pneumonia

Lobar pneumonia is not so frequent in infants as is bronchopneumonia although it does occur occasionally in early infancy. The previous health of the child seems to make little difference, since it often occurs in the strong and robust children. As a matter of fact, the strong child is more likely to contract this form of pneumonia.

There are three stages in lobar pneumonia. There is: first, the congestion; second, the red hepatization, in which the lung becomes filled with a fibrant exudate containing red blood corpuscles; the third stage, that of gray hepatization, wherein the exudate undergoes a decomposition. These stages are of little importance to the chiropractor, except to indicate the degree of momentum attained by the incoördination. The first symptoms usually consist in loss of appetite, general weakness and headache. There is restlessness, excessive thirst, dry skin and a high temperature. There is rapid pulse

and the respirations are from forty to fifty per minute. During the night the child is restless and slightly delirious. Occasionally there are convulsions, but this is very rare.

Equation and Family

The chiropractor is concerned chiefly in the location of the incoördination and the family involved. In order to determine the family it is first necessary to know the functions that are abnormally involved. From the symptoms given we observe readily that all cases of pneumonia, of whatever type, will be in the fever family, but it is quite obvious that this is not the only family involved. From the symptoms manifest we recognize that there is hyperemia and exudate, that this exudate undergoes degeneration and thus becomes of a toxic nature. The fever, or C+ condition, is exaggerated by the presence of this poison being retained in the body. This gives us an overlapping of the poison and the fever families.

Major Adjustment

The major for the poison family is K.P.; for the fever family C.P., the local being Lu.P.; therefore, the combination major is lung place, center place, and kidney place. In making an analysis of the infant with pneumonia it is of the utmost importance to select the specific vertebra in these different regions. Although the patient will have quite a temperature, in many cases a hot box may be detected in the spine. In endeavoring to find a hot box in the spine of an infant the back of the patient should be exposed for sufficient length of time to eliminate the possibility of the temperature being greater at one point than at another because of clothing that may have been heavier at one point than at another.

The vertebra causing the impingement at lung place may be either second or third dorsal. This should be determined by very careful palpation and by the presence of the hot box. We cannot emphasize too greatly the necessity for very care-

ful palpation, since in the child nerve tracing can very seldom be used. In severe cases it may be necessary to adjust as often as once every six hours. With careful conscientious work on the part of the chiropractor, there should be very little danger in losing a patient, even in the most severe cases, and if the adjustments are given in the early stages of the dis-ease, the more marked symptoms will not develop, results will be shown in a very few hours and the child will recover in a short time.

ASTHMA

The type of asthma found among adults very seldom affects infants. The most common form is associated with mild attacks of bronchitis and is of a catarrhal nature. The attacks are very likely to accompany or be associated with different incoördinations involving the bronchi. In some cases the attacks seem to be exaggerated by certain kinds of food which the child eats. It is thought by some that attacks are brought on by the indigestion of some foreign protein. These proteins are very numerous and it is very difficult to determine the particular food in which the offending protein is found. In some patients an attack of asthma may be brought on by the eating of eggs. From a chiropractic standpoint we do not consider that the cause of asthma is in the food which the child eats, although there might be an interference with transmission which would impede the normal processes of digestion, this would result in the production of a poison which might produce certain symptoms. This, however, does not change the fact that when the subluxations are properly adjusted the incoördinations will disappear, regardless of the kind of food that the patient eats.

Symptoms

The acute attack of asthma is accompanied with slight fever and acute catarrhal symptoms. Later the typical asth-

matic symptoms appear in which there is a constriction of the bronchi due to spasms of the unstriped muscular fibers. There is hyperemia in the mucous membrane and a slight exudate. Usually the tonsils are enlarged and there are adenoid growths. There is more or less severe dyspnea, moderate cyanosis and, in severe cases, prostration. The peculiarity in respiration consists in a short inhalation with slow, labored exhalation. Dyspnea may be so severe that it is impossible for the child to breathe lying down. There is an almost constant dry teasing cough. Many infants suffering from asthma are inclined to be rachitic.

Equation

The functions involved are motor and calorific; C+ for the heat in the mucous membrane lining the bronchi and M+ for the contraction, muscular contraction in the bronchi, with T+ for the accumulation of the mucin.

Family

This condition involves two families, the fever and spasms family.

Major Adjustment

Asthma is caused by a subluxation in the lower cervical or the upper dorsal region, producing pressure upon the nerves which transmit mental impulses to the pharynx and bronchi, interfering primarily with the motor function. The major adjustment is lower cervical or upper dorsal in combination with kidney place.

CHAPTER VI

DIGESTIVE TRACT

CHAPTER VI

DIGESTIVE TRACT

GASTRITIS

Incoördinations of the stomach alone are less frequent in infancy than are those of the intestines. Usually the stomach and intestines are involved at the same time and it becomes impossible to differentiate the two. The greater part of digestion during infancy takes place in the intestinal tract, the stomach acting more as a receptacle for the milk from which food passes slowly into the intestinal tract to be properly digested. In an infant one month old the stomach will be empty one and one-half hours after nursing; in bottle-fed babies it will take a little longer. From two to eight months of age the time is about two hours for breast-fed babies and from two and a half to three hours for those taking cow's milk.

Symptoms

The symptoms of gastritis come on very suddenly with pain and tenderness in the epigastric region, and with a high temperature which after the onset decreases. There is thirst, loss of appetite, and vomiting. The vomited matter is usually sour and may be streaked with blood. If there is an excessive amount of blood it indicates ulcers. This is rather unusual, however, in small children. Vomiting is excited by anything taken into the stomach. The thirst is intense, although the water will be vomited as soon as taken. The tongue is heavily coated and the breath is foul. If these symptoms continue intestinal symptoms will soon develop.

The different kinds of gastritis are given as: catarrhal, ulcerative, membranous and corrosive; but the symptoms are

all very much the same and from a chiropractic standpoint a knowledge of the particular pathology would be of no value as the adjustment would be the same. In these cases the difference, or rather specific diagnosis, can not be made, medically, until after the autopsy. In the ulcerative type the condition is more prolonged and there is a greater tendency to hemorrhage which results in a greater amount of blood in the material vomited. Corrosive gastritis is the result of a corrosive poison being taken into the stomach, such as carbolic acid.

Major Adjustment

From a chiropractic standpoint it is immaterial what form of gastritis the child may be suffering from with the exception of the corrosive type which may require the administration of an antidote. In this event the condition passes out of the realm of Chiropractic the same as any other traumatic condition. The adjustment in all cases of gastritis the same as in any other incoördination of the stomach is S.P. If there are symptoms which indicate that the poison family is involved the combination would include K.P.

If adjustments are given at the onset results will be obtained almost instantly. The temperature will soon be reduced, the pain will be relieved and in a remarkably short time the symptoms will all disappear.

CHRONIC GASTRITIS

There are no characteristic peculiarities associated with gastritis when it becomes chronic. There is no advantage in differentiating the chronic from the acute. The symptoms are somewhat less severe, and run a longer course. There is vomiting following meals. Between meals there will be a regurgitation of the food. This form of indigestion is not common among infants but may be found with older children.

The most prominent symptom is that of malnutrition. There is restlessness at night, loss of appetite, constant loss of weight and anemia.

Major Adjustment

The adjustment in the case of chronic gastritis is the same as in the acute attacks. Stomach place is the condition of the stomach with kidney place for the elimination of the waste products which result from the lack of digestion. The kidney place adjustment is also to correct any abnormality in the serous circulation resulting from faulty digestion.

STOMATITIS

Dr. James N. Firth, in his "Chiropractic Symptomatology," states that "There are five forms of stomatitis, viz.: simple, ulcerative, follicular, thrush and gangrenous." It is not our thought to cover this subject in detail as he has done, but only to point out that which is characteristic of stomatitis in infants and small children. In this incoördination the mucous membrane lining the mouth becomes inflamed and swollen. The mouth is hot and the lips dry. The child is fretful and even though hungry refuses to nurse or will cry while trying to nurse. There is quite an increase in the secretion of saliva.

Stomatitis in infants often accompanies the acute febrile dis eases or may appear alone. There will be more or less indigestion with possibly some diarrhea. If the condition remains for a great length of time the child becomes emaciated from the lack of food ingestion.

It is not necessary for us to take up the different forms of stomatitis since the adjustment is the same in all cases. Upon the first indication of stomatitis or the slightest symptom of sore mouth, the infant should receive prompt attention. Strict hygienic measures should be used, especially if the child is being bottle fed.

Equation

In stomatitis the equation is C+ for the simple form; for the suppurative form it is N.C.R.

Family

Simple stomatitis is classified in the fever family. The other forms involve the poison and degeneration families.

Major Adjustment

The adjustment for simple stomatitis is S.P. in combination with M.C.P. If there is any suppuration involving the poison and degenerations family the major will include K.P.

GLOSSITIS

Glossitis is not very common among infants. It is an inflammatory condition of the tongue with hyperemia and swelling. There is usually a slight temperature and the swelling may involve the mucous membrane of the mouth. The tongue may be so greatly swollen that it becomes very difficult for the child to take food. Glossitis is often associated with stomatitis or any involvement of the mucous membrane of the mouth.

Equation

The equation for glossitis is C+ with T+ for the hyperemia. If there is suppuration it is N.C.R.

Family

This condition is in the fever family overlapping the degenerations family in case of suppuration.

Major Adjustment

The major adjustment for glossitis is S.P. and in cases involving suppuration K.P.

STENOSIS OF THE PYLORUS

There are two types of stenosis of the pylorus in infancy. One is a stenosis due to a muscular spasm of the pylorus called a pylorospasm. The other is a stenosis due to a hypertrophy of the pylorus known as hypertrophic stenosis of the pylorus. It is possible for both conditions to be present at the same time. The stenosis may be congenital and is usually called stenosis of infancy. It is considered a serious condition and the mortality is very high.

This incoördination is characterized by constipation, persistent wasting, projectile vomiting, and a marked visible tumor.

Symptoms

The symptoms begin to appear during the first or second week of life. Up to this time the child may have been gaining and showing all signs of perfect health. Vomiting is usually the first symptom to appear and this may be at irregular times but without apparent cause. It soon becomes very forcible and later projectile. The symptoms of indigestion are absent; there is no eructations of gas; the breath is sweet and the appetite is good. There is no evidence of pain and there is no fever, yet the child steadily wastes and loses in weight.

The contests of the stomach are sometimes expelled with such force that the food will be thrown a distance of two or three feet. The food sometimes comes through the nose. The vomiting takes place immediately after feeding and sometimes while the child is nursing. The fact that the child will nurse after vomiting and sometimes will leave the breast only while the food contents of the stomach are being ejected shows that the vomiting is not the result of indigestion; the fact that the food is all expelled at one time and not regurgitated at intervals is further proof. The food seldom remains in the stomach long enough for gastric digestion to take place, there-

fore the vomited food is not digested but it is just about in the same stage as it was when taken into the stomach. In some cases, however, the vomiting may not take place immediately; in some cases the food may even be retained for two or three feedings, although this is unusual.

The constipation is very obstinate from the fact that the food is vomited and does not pass into the intestinal tract. In the severe cases the stools resemble meconium. There is very little fecal matter in the stool. In the severe cases there is persistent loss of weight which may amount to two or three ounces per day. The constipation is very marked and the urine is scanty.

In the mild cases the symptoms are all less marked. The vomiting may be only occasional, the loss of weight is not so great, fecal matter is passed in the stools and there may even be a gain in weight at times.

Due to the character of the vomiting which is projectile the symptoms are sometimes mistaken for cerebral symptoms. The scanty urine and the vomiting confuse the condition with renal dis-ease. It is not difficult to distinguish stenosis of the pylorus from gastric indigestion. The latter rarely develops suddenly, but is very common in infants. The vomiting usually occurs shortly after feeding.

Equation

If the condition is the result of hypertrophy of the pylorus the equation is X+. If it is a case of pylorospasm the equation would be M+. The equation for the loss of weight and wasting is N—.

Family

The family of the hypertrophic condition of the pylorus would be tumor family while the pylorospasm would come in the spasms family.

Major Adjustment

The adjustment for this condition would be stomach place in combination with kidney place. The adjustment results in a relaxation of the muscular fibers of the pylorus and permits the food to pass from the stomach. In case of hypertrophic stenosis of the pylorus there is not only a relaxation of the muscular fibers, but Innate Intelligence removes the hypertrophy and thus enables the food to pass from the stomach. Excellent results are obtained in these cases. Care should be exercised in making the analysis and the adjustments should be given as early in the progress of the condition as possible.

ACUTE INTESTINAL INDIGESTION

This is quite a common incoördination and is very much more prevalent in hot weather. It is found often in very young infants, but more often in children during their second summer. There are many forms and degrees of acute intestinal indigestion among infants and small children. The attacks come on usually very abruptly and may be severe from the beginning. The most outstanding feature of the incoördination is the characteristic diarrhea. In the mild form the symptoms develop suddenly with marked gastric disturbances. At the beginning there is colicky pain and tympanites. There is great restlessness and typical symptoms of colic. The diarrhea appears in a very short time. The color of the stool is at first yellow, then it becomes a yellowish green and finally a grass green. It will usually contain undigested foods. The odor is very foul, grass green, and very much thinner than normal. This mild form may develop into the more severe type or the more severe form may develop suddenly from the very beginning. The temperature rises rapidly. The skin is hot and dry. At the beginning the child is very restless and cries a great deal, but later he lies in

a stupor, the eyes are sunken, pulse is weak and there is all the appearance of an attack of serious illness. There may be anorexia. There is usually great thirst and nausea and vomiting. In a few hours there is marked diarrhea. The stools are yellow and of a thin consistency with a very offensive odor. There is usually much gas expelled. There may be as many as four or five stools an hour. This incoördination is responsible for a great many deaths among children. They respond, however, very quickly to chiropractic adjustments.

Major Adjustment

The subluxation responsible for intestinal indigestion will be found in the lumbar region, usually upper lumbar. It may be necessary to include kidney place for the elimination of the products of the indigestion. This condition is in the fever family overlapping the poison family.

CHOLERA INFANTUM

When the severe type of intestinal indigestion is accompanied with gastric disturbances and severe vomiting, it is known as cholera infantum. In this form the temperature rises rapidly and the symptoms develop quickly and become very severe in a remarkably short time. The vomiting is very severe and usually appears simultaneously with the diarrhea. After the stomach has been emptied of food the vomitus becomes serum and mucous. The contents of the small intestines may regurgitate into the stomach and be vomited up. Vomiting may be induced by taking water into the stomach. The stools are frequent, are of a pale green, yellow or brownish color at the beginning, but later become almost entirely serous. In the severe cases the bowels may be evacuated every few minutes. This type differs from that previously described in that the stools are practically odorless. In rare cases, however, they may be exceedingly offensive. There is probably no other incoördination during childhood in which there is

such a rapid loss of weight. The picture which the patient presents is characteristic. There is great weakness and prostration from the very beginning. The fontanel is depressed and in some cases there may even be an overlapping of the cranial bones. The features become sharp, the eyes are deeply sunken and the angle of the mouth is drawn down. The nose is pinched, the skin over the forehead is tense and dry, the temples are sunken. There is pallor, stupor, marked relaxation of the lips and there will be convulsions and collapse. Statistics show that under medical treatment fully three-fourths of the cases die.

Major Adjustment

Most excellent results are obtained in these cases under chiropractic adjustments. In the severe attacks it will be found necessary to adjust the child as often as once every six hours. The subluxations will be found at stomach place and kidney place and middle lumbar. Some very severe cases have come under our personal observation and in the cases that we have handled personally the results have been 100%. Such cases must be analyzed very carefully and must have the very best care in every way.

CHRONIC INTESTINAL INDIGESTION

Chronic intestinal indigestion is a very common incoördination affecting children. It is more likely to be found among children who are artificially fed. Intestinal indigestion is responsible for a great variety of symptoms that are sometimes considered separate dis-eases.

Symptoms

Children suffering with intestinal indigestion usually present symptoms of malnutrition. They are anemic, the extremities being usually very small. The most striking feature of such a case will be the extremely large abdomen. The

colon is usually dilated as are also the small intestines. There is marked tympanites, which usually increases during the daytime but diminishes during the night. This is one of the principal symptoms which differentiate intestinal indigestion from tubercular peritonitis. Such children are easily fatigued, have a very sallow complexion with dark rings under the eyes. They are usually very much below the average weight and are very cross and irritable.. They do not sleep well, often grinding their teeth and crying out in their sleep. There is usually alternating constipation and diarrhea, the odor of the stools being very offensive. In extreme cases there may be convulsions and other cerebral symptoms. There is seldom any fever.

Major Adjustment

The local major subluxation will be found in the lumbar region with the combination at kidney place. Kidney place is used only when there has been an accumulation of products of indigestion which makes it necessary to increase elimination to take care of these products. In many of these cases the liver is involved and therefore will call for liver place in combination with kidney place and the local lumbar. These cases will respond very readily to chiropractic adjustments.

COLIC

Colic is a common incoördination of infancy and is very prevalent during the first three months. Colic is a symptom rather than a dis-ease and usually indicates intestinal indigestion or some inflammatory condition of the intestines. It is characterized by sharp paroxysmal pains in the intestines. A child who is subject to colic will usually be suffering also from constipation. The crying of a colicky child is characteristic, being very violent and paroxysmal, which presently subsides only to be followed with another attack. During these spells the lower extremities will be drawn up and the

abdomen will be tense from the accumulation of gas. In mild cases the child will not cry out but will be fretful. This may be wrongly construed to be the result of hunger. When the attacks of colic come on the child will show a desire to nurse and will take the breast as though very hungry. This may be followed by relief from the pain, but this relief is only temporary and when the pain returns it is usually more severe. There is probably no incoördination of childhood that is quite so trying to a chiropractor as an acute attack of colic, due to the violent crying of the child and the eager desire on the part of the chiropractor and the attendants to relieve the pain. It is often quite hard to obtain a correct analysis in such cases because of the difficulty experienced in getting the child into a proper position for palpation. In making the palpation the chiropractor should take plenty of time and should never endeavor to force the child to be still, rather he should adapt himself to the constant moving about of the infant.

Major Adjustment

The major varies somewhat in these cases so far as a specific vertebra is concerned, but the local will always be found in the lumbar region, usually the first or second lumbar vertebra. Kidney place should be used as a combination.

VOMITING

During nursing the infant swallows quite a little air and not infrequently this is the cause of vomiting immediately following feeding. It is not uncommon for an infant to vomit without effort after overfilling the stomach. This is a natural thing among healthy children and needs no attention from a corrective standpoint. In such cases the milk is but little changed.

In gastric indigestion and gastritis vomiting is always present, but in these cases it does not take place until some time after feeding, perhaps several hours. In gastritis the

vomiting is more constant. In the more severe cases there will be not only the partially digested food but also bile and mucus and sometimes traces of blood.

Obstructive vomiting is sometimes found among infants and may be due to intestinal obstruction or to an obstruction of the pyloris. The obstruction may be congenital or it may develop after birth. Obstruction of the pyloris may be the result of hypertrophic stenosis. In this condition the child vomits immediately following feeding and with great force. This is thoroughly described in the article on Hypertrophic Stenosis of the Pyloris. If the obstruction is in the intestinal tract it may be the result of a congenital malformation or due to intussusception. The vomiting is forceful and the vomitus may contain fecal matter.

Vomiting is often associated with peritonitis and appendicitis. In these conditions there is distention of the abdomen with abdominal pains which may be localized. There may also be a slight temperature. Vomiting is purely adaptative on the part of Innate Intelligence. The food can not be digested and carried through the digestive tract so Innate realizes that the best thing to do is to free the body from it in the quickest manner.

Vomiting often precedes such incoördinations as pneumonia, scarlet fever and malaria and may precede any of the febrile dis-eases. Vomiting may be produced by the accumulation and absorption of toxines in the body.

Infants suffering with nervous disorders such as acute meningitis, tumors of the brain and other central conditions will often have cerebral vomiting. In this event the vomiting is spontaneous and does not necessarily occur at feeding time. Other cerebral symptoms present will aid in determining the analysis.

Vomiting may be produced by the presence of worms that come up into the throat from the stomach and intestinal tract.

Hunger may occasionally bring on an attack of vomiting. This is more common in older children than in infants.

RECURRENT VOMITING

This is also known as cyclic vomiting and periodical vomiting. It is characterized by recurrent attacks which may be weeks or months apart. They come on without any apparent cause and from the descriptions and explanations given in medical science very little can be done medically to control the vomiting which at the end of two or three days will cease spontaneously. The attacks recur at different intervals, usually less often, gradually decreasing until they cease altogether when the patient is about the age of ten or twelve years.

Symptoms

There is loss of appetite and malaise. The pulse becomes rapid and in some cases there is slight temperature. There is usually headache and excessive thirst. During the attack of vomiting there is extreme retching and great distress. The symptoms are similar to migrane in adults. This condition must be differentiated from tubercular meningitis in which there is vomiting without apparent cause. The course of the symptoms will soon enable a positive differentiation. In acute indigestion there is vomiting, but the history of the case reveals the fact that the attack was brought on by undigested food. It is very easy to distinguish this type of vomiting from that of appendicitis, since in appendicitis there is marked tenderness at McBurney's point, also pain and the characteristic rigidity and muscular contraction. In intussusception the symptoms are usually more severe and there is blood and mucus in the stool.

Major Adjustment

Since there seems to be no particular indication of indigestion or impaired functions, and no pathological changes, it is

evident that the function involved is that of motor. But regardless of the primary function that is interfered with a subluxation will be found at S. P. and in most cases there will be a hot box during the acute attack. The vertebra most commonly subluxated is the sixth dorsal. In most cases there is no combination and results will be obtained in a very short time by adjusting nothing but the S.P. subluxation. In the severe cases it may be necessary to adjust as often as once every six hours until the vomiting ceases. Ordinarily the vomiting will cease in a short time and in most cases marked improvement will be noted after the first adjustment.

Vomiting occurs in gastric indigestion, intussusception, meningitis, peritonitis, pyloric stenosis, uremic poisoning, and in many other acute incoördinations.

CONSTIPATION

The first bowel movement after birth is known as meconium and is a dark brownish-green color, and of a semi-solid consistency. During the first two or three days the bowels move from four to six times daily. On the third day the character of the stools begin to change and by the fourth day the feces has become normal.

The normal stool of a normal nursing infant is about the color of the yolk of an egg, and may be slightly green. The average amount is about two ounces daily. The stools should never be watery, but of a butter-like consistency. During the first few weeks the infant's bowels will move on an average of four times daily. After about six weeks the average will be two a day. The stool changes in character as soon as the child is placed upon a mixed diet. It then becomes more like that of an adult but remains softer.

Constipation is one of the most common incoördinations of infancy and childhood. There are many factors to be considered and many things that contribute to the condition. In older children habit plays no small part in aggravating con-

stipation. For this reason the child should be very carefully trained early in life to obey the first call on Nature in this respect.

Normally the infant should have two bowel movements a day, although some have more while others may have only one. Frequent movements do not, however, mean that the child is not constipated or costive. With two or three dry hard stools per day the child would be costive. Constipation is the result of a lack of motor function in the muscular walls of the intestines while costiveness is the result of a lack of secretion due to interference with transmission of secretory mental impulses. The two conditions are often associated. When there is a lack of motor function in the muscular walls. the fecal matter will not be forced out of the intestinal tract fast enough and much of the moisture will be absorbed, thus leaving the fecal matter dry and hard. This is not a true costiveness and should not be mistaken for such.

In costiveness there may be colicky pains which may be increased, and may at times be quite severe, when the hard dry fecal matter is passed. The general health of the child may be seemingly normal. In severe cases hemorrhoids and even hernia may be developed from the constant straining.

Major Adjustment

These cases are simple and respond readily to chiropractic adjustments. The combination varies somewhat in different cases. In constipation the major will be a lumbar vertebra. In costiveness, where secretions are involved, the combination will include a Li.P. and K. P. In some cases excellent results are obtained by adjusting ninth dorsal.

INTUSSUSCEPTION

Intussusception is a condition wherein there is a telescoping of the intestines in which one portion passes into the adjacent portion and produces an obstruction.

This condition occurs most often in early infancy, although

not very commonly. The most frequent site is at the ileocecal valve. It may, however, occur at any point in the intestinal tract. When it occurs in the small intestine it is known as enteric intussusception; in the colon as colic; and at the ileocecal valve as ilecocecal.

Intussusception may be chronic or acute. In the chronic cases there may be adhesions which will make it very difficult for Innate to accomplish a reduction.

Symptoms

The onset is usually accompanied with paroxysmals of pains and vomiting. The pains may be very severe and the vomiting projectile. The pain may be mistaken for that of ordinary colic, but it is much more severe and may continue through the entire attack.

The vomiting is persistent, especially at the onset, and occurs as soon as food enters the stomach. In older children it may be stercoraceous after the third or fourth day. It never occurs, however, in infancy. The vomiting is the result of the intestinal obstruction and is adaptative on the part of Innate Intelligence. It is quite obvious that it is better not to have food in the stomach than it is to have it and not be able to complete the process of intestinal digestion.

The character of the stools is of importance. At first the bowel movements may be diarrheal and later there will be no fecal matter, but the stool will contain nothing but blood and mucus. A paroxysm of colicky pain may be followed by a mucous and bloody stool several times daily. At the onset the abdominal walls are soft and relaxed, or may even be retracted. Tympanites may occur about the second or third day.

The symptoms in the acute cases are those of shock. There is an extremely anxious look on the face which is pallid, cold extremities, subnormal temperature and cold perspiration. There is restlessness and in many cases convulsions. Later

there will be stupor. A sudden rise in temperature indicates a turn for the worse and may mean death in a short time. In the chronic cases there is marked inanition which progresses very rapidly.

Major Adjustment

The subluxation interfering with the transmission of mental impulses causing intussusception will be found in the lumbar region, the specific vertebra depending upon the location of the intussusception, whether in the upper or lower intestinal tract. Most excellent results have been obtained in these cases, and there should be no hesitancy in adjusting. The function involved is motor, which prevents a coördinate action of the muscular walls of the intestines. As soon as this action becomes normal Innate Intelligence will correct the condition and all symptoms will subside.

ICTERUS

Icterus is a rather common incoördination of infancy. It is characterized by yellowish discoloration of the skin produced by the accumulation of bile pigment. This is the result of an occlusion usually of the common bile duct, which prevents the bile from passing into the duodenum. There are two forms: the physiological and the pathological. In the physiological there is an inflammation in the mucous membrane lining the common bile duct. This causes a decrease in the size of the lumen, which obstructs the flow of bile. In the pathological there may be a complete obstruction due to malformation or there may be a congenital absence of the bile duct. While the common bile duct is the most common seat of the pathological type, yet the hepatic and cystic ducts may also be involved.

Symptoms

The most prominent symptoms is the discoloration of the skin. In the severe obstructive jaundice the stools are white,

the urine dark brown and bile-stained and the liver and spleen often enlarged. There may be severe convulsions. In the more common and less exaggerated cases the foregoing symptoms are present but in a milder form. There is typical jaundiced discoloration which in some cases will appear soon after birth. This will continue for a few days and may become quite marked. The stools will be colorless, while the urine will be highly colored.

Equation and Family

The equation is secretion plus (T+) and excretion minus (E—) for the accumulation of the bile. The family is the poison family. In case of temperature it overlaps the fever family.

Major Adjustment

The chiropractor must not conclude that the case is one of congenital malformation or absence of the bile duct merely because of the extreme discoloration of the infant. Cases have come under our observation in which the symptoms would all indicate that the case was hopeless, but under chiropractic adjustments they have recovered. It must be recognized, of course, that if there is a congenital absence of the bile duct the case is hopeless, but since there is no way of determining whether it is a mere obstruction or congenital absence, the case should by no means be considered hopeless. Every effort should be made to locate and adjust the subluxation. The subluxation will be found at liver place which must be adjusted in combination with kidney place. Kidney place is required for the elimination of the accumulated bile. These cases will respond very quickly and satisfactorily under chiropractic adjustments.

CHAPTER VII

MISCELLANEOUS

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MISCELLANEOUS

MALNUTRITION

This condition may result from a lack of the proper amount of food and from unhygienic conditions. However, it is often found among the children who should be properly nourished, who have the very best of care and the most wholesome food. There is no definite standard by which to determine a case of malnutrition. The extreme cases are obvious, but a child may be simply underweight and still not be classed as a case of malnutrition. Up to eleven or twelve years of age a child is not usually considered properly nourished if he is 10% below the normal standard of weight for his age and height. If the food supply is insufficient in quantity or quality, if there are bad habits of eating, such as bolting the food, insufficient mastication, and irregular hours of eating, these should all receive proper attention. If, on the other hand, the supply of food is sufficient in quantity and quality, if all habits of eating are normal and there is malnutrition, it is because the food is either not properly digested or not properly assimilated, or both, and the child should receive prompt attention at the hands of a competent chiropractor.

Symptoms

The symptoms of malnutrition are very obvious and need no special mention here. Such children are usually irritable and fretful. They are of a nervous disposition and very active. They are usually very bright mentally and often excel in their school work. Children suffering with malnutrition are very susceptible to different incoördinations and may be sick a great deal.

Major Adjustment

In these cases, if the child is provided with food having sufficient nourishment, most excellent results will be obtained from chiropractic adjustments. A very careful analysis must be made in order to determine all the facts in the case for the major differs in different individuals. In some cases the major will be C.P. and K.P., in others S.P., K.P. and a lumbar, while in some cases Li.P. and Sp.P. may be involved.

INANITION

This is the term applied to the condition resulting from the lack of food assimilation, It affects principally young infants. It is characterized by a persistent loss of weight with more or less severe symptoms which may appear rather suddenly.

Symptoms

The infant's pulse is weak and rapid and the temperature may be high. There is scanty urine, cold extremities and great muscular relaxation. The face presents a peculiar bluish gray color. There may be cyanosis. There is rapid irregular respiration. In the more severe cases there may be stupor, while in others the child is very restless and fretful. Pupils are contracted and the fontanel is sunken. The progress of the incoördination may be rapid and in very young infants death may occur quite suddenly. Breast feeding is very essential in these cases.

Major Adjustment

Inanition is really malnutrition in the young infant due to a lack of assimilation of nutrition. The major adjustment is C.P. or S.P. and K.P. In some cases Li.P. may be involved, while in others Spl.P. may enter into the combination.

MARASMUS

This condition is also called infantile atrophy and simple wasting. It is not very common and is usually found in institutions for infants. It affects infants who are unusually weak. It is said to result largely from improper food and feeding and also it is influenced by the surroundings. In these cases the methods of feeding and the character of food should be carefully investigated. If these are found satisfactory it will then be obvious that the food is not being properly digested. This calls for a careful analysis and adjusting of the child. In these cases the food can not be assimilated because it is not properly digested. There is a progressive and persistent loss in weight. The body temperature becomes subnormal, the lung expansion imperfect, emaciation very marked, the skin deeply wrinkled and the face and arms take on a very old appearance. The eyes appear very large, the temples and fontanels are sunken, and the abdomen becomes very prominent. The child is very susceptible to all forms of incoördinations and because of the extreme weakness may succumb quickly to any acute dis-ease. In some cases after the emaciation has become very marked there may be an unusual and sudden gain in weight due to a general edema. This condition may increase until all the tissues of the body become extremely water-logged. The large cavities, however, are very seldom affected. Infants under seven or eight months of age are likely to be affected by this edema.

Major Adjustment

These cases call for a combination major which consists of S.P. and K.P. and an Up.L.P. Excellent results will be attained in these cases if adjustments are given early enough in the stage of the incoördination. The patient is never too weak to be adjusted.

SCURVY

Scurvy is a condition resulting from faulty nutrition. It is characterized by a swelling of the joints, sometimes pseudo-paralysis of the lower extremities and a spongy condition of the gums which have a tendency to bleed. There may be cachexia and anemia. This condition is supposed to result from a continuous diet lacking in the vitamin C.

Symptoms

Usually the first symptoms to appear are tenderness of the legs. This will be observed from the fact that the child cries when his legs are moved. Eventually this tenderness localizes about the knees and ankles and it is accompanied with swelling of these parts. The gums then become swollen and show a marked tendency to bleed. This swelling may produce pain sufficient to interfere with the child taking food. The child loses weight, becomes very fretful, and has a slight fever. There is a characteristic posture in which the hips are rotated outward, while there is a semi-flexion of the thighs and legs. The child will usually lie very quietly because any movement produces pain, especially in the legs. There is marked sub-periosteal hemorrhages which may be so great that the limbs will become twice their normal size. In severe cases epiphyseal separation is not uncommon. Scurvy is very often associated with rickets. However, it is affirmed that they are two separate conditions and not just different forms of the same condition.

Major Adjustment

This incoördination requires a combination major which will be found at C.P. or S.P. and K.P.

RICKETS

Rickets is also called rachitis and known by some as Barlow's dis-ease. It is listed as a dis-ease of nutrition, although

the most important anatomical changes which take place are those affecting the bones. This dis-ease is found among people of all classes. There is no race that is immune, yet some nationalities seem to suffer more frequently and severely than others. Negroes and Italians seem to be especially susceptible when placed in northern climates and congested quarters in northern cities. In general practice rickets is considered a rather uncommon incoördination, although in congested cities it will be found quite prevalent.

Symptoms

The first symptoms to appear are nocturnal restlessness and profuse sweating about the head during sleep. The restlessness is usually quite marked; the patient rolls and tosses a great deal, and almost constantly moves the head back and forth on the pillow. Because of the profuse sweating the child becomes very susceptible to colds, bronchitis and bronchial pneumonia. A case of rickets is rather easily recognized by the large head, the pigeon breast, beaded ribs, the deformities of the extremities, the swelling of the epiphyses of the wrists and ankles, and the prominent abdomen.

Deformities of the Head

Deformity of the head appears very early in the dis-ease and is due to the thickening of the cranial bones, producing the typical square head of rickets. This square head is known as caput quadratum. Numerous soft spots are formed in the cranial bones which when pressed upon give one the impression that he is feeling parchment. This is known as cranial tabies. The fontanels and sutures are very late in closing, sometimes as late as the third or fourth year. The large rachitic head must not be mistaken for hydrocephalus.

Deformities of the Thorax

The chest is deformed in such a way that the transverse diameter is decreased and the antero-posterior diameter is in-

creased. This produces the typical pigeon breast. Such deformity is caused from the softening of the thoracic bones. Beading of the ribs is characteristic and is known as the rachitic rosary. These nodules are formed at the junction line of the costal cartilages and the ribs. While these nodules are always present, they are not always visible. The rachitic gurgle, which is a transverse depression extending from one side of the chest to the other and is about two inches broad, is also present.

Deformities of the Spine

The most characteristic deformity of the spine in rickets is a kyphosis usually involving the lower dorsal and the entire lumbar region, although lateral curvatures may appear. In a well defined case of rickets every bone in the body may be abnormally involved. The deformity of the spine results from a softening of the bones which give way under the weight of the trunk.

Deformities of the Extremities

A case of rickets usually presents characteristic curvatures of the bones. The long bones are, as a rule, involved symmetrically. Green stick fractures very often occur. In practically all cases of this dis-ease there is an arrested longitudinal growth in the bones. Because of this the height will often be very much less than that of the normal child. There is marked enlargement of the epiphyses at the wrists and ankles. The slight curvatures in the bones of the arms will be exaggerated when the child begins to creep and the curvatures in the legs will be increased when the child begins to stand and walk.

Deformities of the Abdomen

Due to the general motor minus condition of the abdominal muscles there is developed a condition known as pot belly.

This enlargement is often exaggerated by intestinal indigestion and constipation. This constipation results from the motor minus condition which interferes with the vermicular movement of the intestinal tract.

Equation

The function that is primarily involved in rickets is nutrition, but this results in other functions being implicated. There is expansion minus especially in the development of the osseous tissue. The equation is N— with X—.

Major Adjustment

Most excellent results are obtained in rickets. It is very essential that the adjustments be given at the beginning before the deformities become marked. In the more chronic cases the incoördination will be checked by the adjustments and the patient will recover, but it will be obvious that the marked deformities such as genu varum, genu valgrum, enlargement of the wrist and deformities of the head can not be corrected in the chronic cases. The adjustment is At. or Ax., S.P. and K.P.

NEUROTIC CHILDREN

Neurotic symptoms may appear very early in infancy. They may be first noticed when the child is startled by sudden sounds or unusual sights. Ordinarily the infant, only a few weeks of age, will pay little or no attention to its surroundings. The neurotic infant, however, may be startled or badly frightened by its environment. Such infants are found to apparently fix their attention upon objects as early as the third or fourth week. If its attention is thus centered upon a person who should make a quick, unexpected move, the child often becomes terrified. In other cases the symptoms may manifest themselves in a muscular spasm, such as mild opisthotonos, and other conditions suggesting cerebral in-

coördination. In early infancy vomiting and diarrhea may be brought on by excitement. The vomiting takes place without nausea and may be excited either by food or water. This must be carefully distinguished from the spitting up of milk so characteristic in infancy. This is a perfectly normal process and seems to be Innate's method of adaptation when the child has taken too much milk into the stomach. Vomiting in neurotic infants may even become so severe that it results in a loss of weight. The diarrhea occurs with no more apparent cause than the vomiting. If the stools are not too frequent the food will be well digested but the diarrhea may become so severe that the food passes through the intestinal tract undigested. This diarrhea may be very obstinate and then it results in serious malnutrition. As the child grows older the characteristic symptoms of infancy become less marked but the child continues to be extremely nervous, irritable and cross. This nervousness may be exaggerated by the surroundings. Such children usually have poor appetite and suffer from constipation. They are almost always poorly nourished and anemic. The pulse is usually more or less rapid and is generally affected by excitement. Such children are quite restless during sleep.

Neurotic children are often precocious but lack in concentration due to their restlessness. Headache is a very common symptom. There is a marked tendency toward habit, spasm and chorea.

Family

These conditions are classified in the spasms family.

Equation

The equation is not so well defined since the condition of nervousness is adaptative. Therefore the equation for the nervousness is I.A. If other symptoms appear the equation would depend upon the function involved.

Major Adjustment

It is maintained by most authorities that this nervousness is inherited, but it has been demonstrated clinically by Chiropractic that results are readily obtained by chiropractic adjustments. It is reasonable to assume that there are environmental conditions which might produce nervousness even in the small infant, but it is also recognized that if the child is normal he soon becomes accustomed to the peculiarities of the environment and pays little or no attention to them. Subluxations in the cervical region, usually atlas or axis, are found in these children. These subluxations may produce sufficient cord pressure to cause such symptoms as usually manifest themselves in malnutrition as so-called nervous indigestion and other symptoms which would indicate constitutional disorders. A very careful analysis reveals that the nervousness in some of these cases is adaptative to some other incoördination. If the nervousness is direct the major adjustment will be Up.C. with a possible combination of C.P. and K.P. If the nervousness is adaptative, then a very careful analysis must be made to determine the incoördination to which it is adaptative. The major then will be determined by the location and the family involved.

CONVULSIONS

A convulsion is a violent involuntary contraction of muscles which ordinarily contract only under direction of the will. It may be either clonic or tonic. A clonic convulsion consists of a spasm of the muscles with alternating contractions and relaxations while the tonic spasm consists in constant rigidity of the muscles involved. The contractions may be confined to certain muscles or sets of muscles as, for example, the muscles of the face, the trunk or the extremities. In some cases the muscles of the entire body are involved.

During the first eighteen months of life the child is more susceptible to convulsions than at a later age, although the condition is rather common during childhood. Convulsions accompany many incoördinations and are considered adaptative to some other condition. Therefore the first thing to consider in a case of this kind is the primary condition or the incoördination to which the convulsion is adaptative.

The more common conditions with which convulsions are associated are: Incoördinations involving the nervous system, such as cerebra-spinal conditions; rachitis; and organic and functional disorders. Any condition which produces an irritation of the nervous system may result in a convulsion of more or less violence. For this reason children are often subject to convulsions during dentition and disorders resulting in slight temperature. Cerebral tumors, abscesses of the brain, hydrocephalus and meningitis are examples of cerebral conditions in which convulsions are commonly found.

Subluxations in the upper cervical region are often produced at the time of birth which cause cord pressure, making the child susceptible to all conditions that would irritate the nervous system.

There may be K.P. subluxations interfering with the process of elimination resulting in an accumulation of poison within the body, or there may be other subluxations resulting in the production of toxines within the body and these will produce an irritation of the nervous system resulting in convulsions. Disturbances in digestion, affections of the respiratory tract, a sudden rise of temperature and incoördinations involving the gastro-intestinal tract are often responsible for convulsions. Convulsions are quite frequent at the onset of acute dis-eases such as whooping-cough, measles and mumps. They are often associated with enlargement of the thymus gland.

During the convulsion there may be loss of consciousness with tonic and clonic spasms in various degrees of severity.

The urine may be voided and the bowels evacuated. In the very young infant a single attack may prove fatal, although this is rather unusual. When death occurs in this way it is most often due to asphyxia, or when the convulsions recur in rapid succession death will result from exhaustion.

The clinical picture is quite typical. Usually there is pallor of the face which may be followed quickly with a twitching of the facial muscles, and sometimes those of the hands and feet. In most cases the attack comes on without warning; the eyes become fixed and rolled backward; the twitching usually begins in the face and very soon the entire body is involved. The face is distorted by muscular contractions, the head is drawn backward and the neck is thrown forward; there may be frothing at the mouth. The pulse is irregular and weak, the respiration is shallow and feeble while there is cold perspiration of the forehead and it may also be on the body. The thumbs are turned into the palms and the hands are tightly closed. There is rythmical convulsive movements consisting of alternating flexion and extension.

The attack usually lasts from a few minutes to half an hour and sometimes longer. The patient is left in a more or less state of exhaustion and the attack may be followed by stupor and coma. Very often convulsions in children over two years of age indicate the onset of some acute condition such as pneumonia or scarlet fever. However, convulsions may mean very little with small children that are extremely nervous. During the first few days of life they may be the result of temporary circulatory disturbances in the brain from prolonged pressure in difficult labor.

Family

All cases of convulsions are in the spasms family no matter with what other conditions they are associated. If there are other complications, and there usually are, the family for the complications will depend upon the functions involved.

Major Adjustment

When a chiropractor is called to see a child that is having convulsions he should make a very careful inquiry into the history of the case and try to find the associated incoördination. This is done for the purpose of determining the combination to be used. The major for location will be atlas or axis, while the combination will depend upon the associated condition. This may be K.P. or it may be S.P. or any other combination which would include the subluxation for condition.

Excellent results are obtained in cases of convulsions. The adjustment should be given as soon as possible. In many cases an adjustment of the atlas or axis will bring the child to consciousness and prevent a recurrence of the attack. The convulsion may be caused by an atlas subluxation with no accompanying condition. This is known as a direct convulsion and will respond very quickly to an adjustment.

NOCTURNAL ENURESIS

As early as the tenth or twelfth month of age the child may be trained to make known his desire to empty the bladder. However, with some children this may not be accomplished until two and a half years of age. If by the third year of age the child is unable to retain the urine for a normal length of time, it is evidence of some abnormality and should receive Chiropractic attention. The child is afflicted with what is known as enuresis, which may take place during the day or night, or both. If it occurs during the day, it is called diurnal; while if it takes place during the night, it is known as nocturnal. It is more likely to take place during the night, since it may be possible for the child to control the bladder during waking hours.

We are most concerned with the nocturnal enuresis, be-

cause this form causes the child more discomfort and it is more difficult to control than the diurnal.

We recognize nocturnal enuresis as an adaptative condition. That is, the emptying of the bladder is a perfectly natural process and will always take place under certain conditions. For example, if the sphincter muscle relaxes, the urine will be voided. In this event, we are not concerned in the voiding of the urine, but in the cause for the relaxation of muscle which prevented the bladder from retaining the urine. There are a number of conditions to which nocturnal enuresis is adaptative. The following are the most common:

Incoördinations involving the nervous system.
Highly acid urine.
Excessive quantity of urine.
Abnormalities and incoördinations of the bladder.
Irritation of the genital organs.

Incoordinations of the Nervous System

The incoördinations of the nervous system in which there may be nocturnal enuresis are those commonly found in extremely neurotic children, and children who are undernourished and anemic. Chorea, neurasthenia and hysteria are examples of conditions in which nocturnal enuresis is very common. Nervous children are easily disturbed during sleep and are prone to dream, at such times the innate interpretation of the vibrations produced by the urine in the bladder reaches the educated mind and there is not sufficient reasoning of the conscious mind to enable the child to realize where he is or to prevent the following of the natural desire to urinate.

The inability of the child to control the bladder during acute illness must not be mistaken for habitual nocturnal enuresis; for this will be only temporary, and will disappear when the child recovers from the acute attack.

Highly Acid Urine

In some cases, the urine being highly acid, produces vibrations in the bladder which results in Innate Intelligence causing the sphincter muscle to relax, which results in the voiding of the urine. This is an adaptative action on the part of Innate to prevent the acidity of the urine from setting up an irritation in the bladder. If the urine remained in the bladder it would damage the tissues and call for an expenditure of energy for reparation; this is all prevented by getting the urine out of the bladder as soon as possible. The hyperacidity of the urine is the result of the lack of the expression of mental impulses in the body and should receive immediate attention, that the cause of the incoördination may be removed. When this is accomplished the nocturnal enuresis will cease.

Excessive Quantity of Urine

In some incoördinations there is abnormal thirst which results in the child drinking more water than is required for the normal bodily processes. The natural channel through which this excessive amount of water is excreted is through the kidneys. This results in the bladder being filled often, which necessitates the frequent passing of urine. The child might be able to control the bladder during waking hours and make his wants known; but in sleep, as the bladder becomes full, Innate would relax the sphincter muscle, which would allow the urine to escape in order to relieve the pressure. To overcome the nocturnal enuresis in a case of this kind, it is necessary to adjust for the cause of the excessive thirst; and when this is corrected, the bed wetting will cease.

Incoordinations of the Bladder

Abnormal conditions of the bladder will cause difficulty in retaining the urine for a normal length of time. An inflammation of the bladder is greatly exaggerated by the

presence of urine, therefore an irritation would be set up which would result in a desire to empty the bladder. This would invariably result in nocturnal enuresis. An interference with the transmission of motor mental impulses to the sphincter muscle would be another cause for bed wetting. In this case, it would be impossible to retain the urine after a certain amount had passed into the bladder. This would result in enuresis, since there would be nothing to prevent the urine from passing freely from the bladder.

Irritation of the Genital Organs

In some cases there is an irritation of the genital organs resulting in the production of vibrations which, when the child is asleep, results in enuresis. This irritation may be produced by an adherent prepuce. Balanitis and phimosis are also quite common conditions. There may be an irritation of the rectum produced by pin-worms. Vaginal irritation may be the result of vulvovaginitis, or due to adherent clitoris.

Correction of the Condition

It is asserted by some that nocturnal enuresis in many cases is due largely to habit. We see no more reason for considering this condition a habit than for considering any other abnormal condition a habit. It is the result of interference with the transmission of mental impulses, and it is the duty of the chiropractor to find the condition to which nocturnal enuresis is adaptative and correct the cause of that condition.

Some parents have the idea that bed wetting is a habit, and the child should be punished in an effort to break him of the habit. This, however, is the wrong attitude and no good will be accomplished in this manner. Punishment will only tend to make the child nervous and the condition worse.

This condition yields so easily to Chiropractic adjustments that there is no reason for allowing a child to continue without

relief from this most annoying condition. We have never seen a case that did not respond to adjustments after the proper analysis was obtained.

In analyzing a care of nocturnal enuresis it must not be taken for granted that the major is K.P., or even a lumbar. For this may not be true. A most thorough analysis should be made to determine the exact condition of the child. If the nervous system is involved, there will likely be found an atlas or axis subluxation. We have seen many cases that had been adjusted persistently at K.P. and a lumbar, but with no results, while an adjustment of the axis would get almost immediate results. This does not mean that every stubborn case will respond to an axis adjustment.

Scanty and highly colored urine, which has a tendency to scale and irritate the skin, usually indicates highly acid urine. In this case a careful analysis must be made to determine the cause of the acidity. The palpation will reveal a subluxation and most likely a hot box at C.P. and K.P. In many cases the child will be anemic, and in a general rundown condition; in this case the combination will be S.P. and K.P.; the combination may also include a lumbar.

In the cases involving the bladder, the major will be a lumbar vertebra. The combination will be determined by the local condition, which may necessitate the use of K.P. When there is an irritation of the genital organs or adjacent structures, the major will include a lower lumbar vertebra and may or may not require a K.P., the combination depending upon the character of the local condition.

From the foregoing it will be observed that the major for nocturnal enuresis varies, depending upon the condition to which it is adaptative. The major may include At., Ax., C.P., K.P., lumbar, or any combination of these or other subluxations. When the impingements are found, and the causative subluxations adjusted, complete results will be obtained—in every case.

OPHTHALMIA

This is an incoördination characterized by inflammation of the conjunctiva. It is also called purulent conjunctivitis. Medically these cases are supposed to be produced by gonorrhea, although in many of the milder forms the gonococcus is not present. This is evidence that the cause is not the gonococcus but that the germs, when present, are there because of the pathological condition of the tissues.

Symptoms

The eyelids are swollen, there is a copious, purulent discharge, and there may be ulceration of the eyelids.

Major Adjustment

The major for this condition is a combination major which includes a middle or upper cervical for the location and kidney place for elimination.

TETANUS IN INFANTS

This is a condition which is occasionally found in young infants and is the result of an infection usually of the umbilical wound. It is most prevalent where conditions are unsanitary. Tetanus is characterized by a tonic spasm of the muscles. It may affect all the muscles of the body or it may be limited to the muscles of the jaw, producing what is known as trismus or lockjaw.

Symptoms

The first symptom to appear may be the spasm in the masseter muscle which interferes with nursing the child. The muscle of the face and jaws appear firm and hot and the lips slightly protrude. Intervals will occur when the muscles will be completely relaxed. At first these paroxysms appear at intervals, between which the relaxation is complete; but later

they become more frequent and the relaxations less marked until there is more or less of a continuous rigidity. This contraction grows more exaggerated until the entire body becomes rigid. The jaws become set and may be separated only slightly, if at all. There is a peculiar characteristic facial expression due to the contraction of the facial muscles. Swallowing becomes very difficult. There is a weak, rapid pulse. In the mild cases there is only a slight temperature, but in the more severe cases the temperature may become extremely high. The cry becomes weak and whining. The incoördination is of short duration. The child soon dies from exhaustion or from suffocation due to the rigidity of the respiratory muscles or it may be due to a spasm of the larynx. While tetanus is not a very common incoördination, the mortality is very high. Authorities place the fatality as high as 90% and even 95%.

Equation and Family

The equation is excretion minus (E—). The family is poison and contractures.

Major Adjustment

If these cases are adjusted at an early stage excellent results will be obtained. There is a combination major at At.P., C.P., and K.P.

PEMPHIGUS NEONATORUM

This is a rather unusual condition seldom found in general practice. It usually occurs as epidemics in institutions where large numbers of children are cared for. Outside of such institutions it is more common among children in unhygienic surroundings. It is characterized by an eruption of blebs containing a serous fluid.

Symptoms

These blebs appear about the third or fourth day and may be found upon any part of the body, but usually upon the exposed parts. They remain for a time and then rupture or dry up. There is no suppuration. As the blebs enlarge they sometimes coalesce, covering quite a large area. The epidermis is loosened by a serous exudate which occurs directly beneath it and separates it from the true skin. The case produces a very striking picture having the appearance of being extensively burned. After the blebs have ruptured the epidermis hangs in shreds, leaving a very bright red surface beneath. In this way there may be large areas of the body almost completely denuded of the epidermis. There may be a very slight temperature and slight restlessness. There is great depression and marked weakness. The symptoms at first appear rather slowly, later the dis-ease progresses very rapidly, death often occurring in from twenty-four to forty-eight hours. Pemphigus neonatorum should be distinguished from congenital syphilis. The liver and spleen are usually very greatly enlarged in syphilitic cases and there are usually other characteristic symptoms present, such as changes in the nails, mucous membrane and other parts.

Equation and Family

The general equation is excretion minus (E—). The condition is in the poison and fever families.

Major Adjustment

The major adjustment is C.P. and K.P.

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